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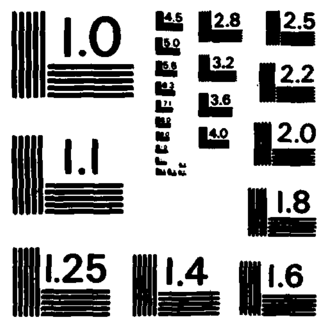

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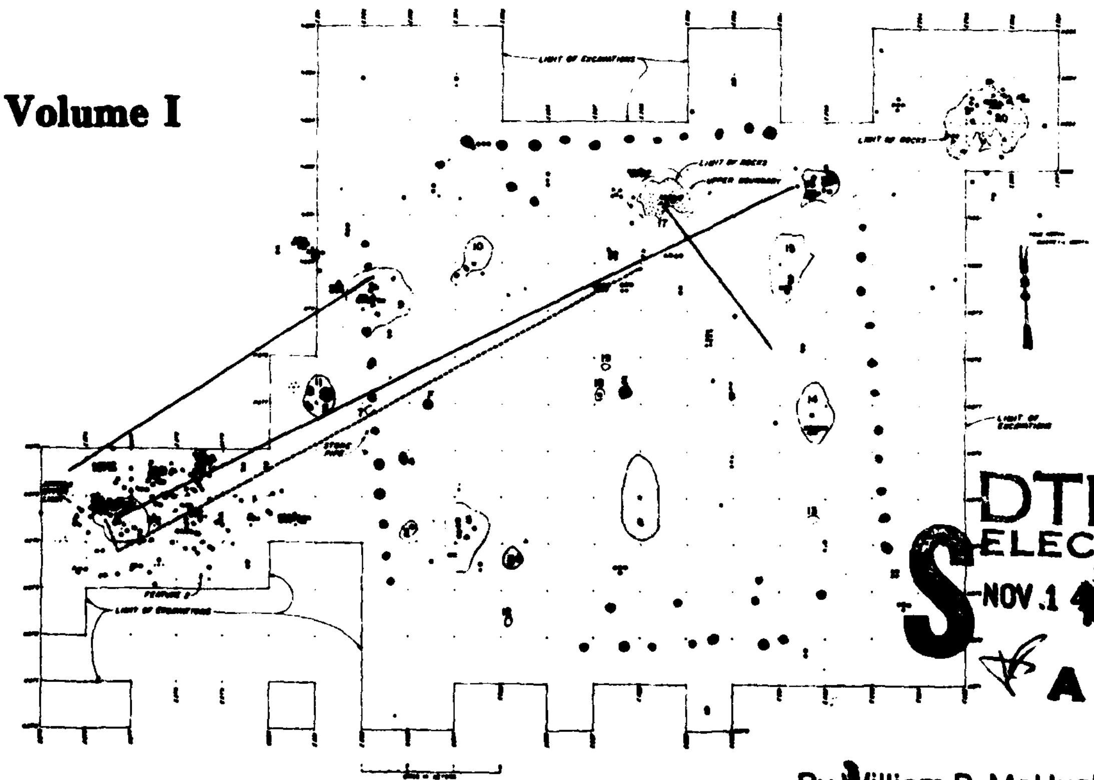
Before Smith's Mill; Archaeological and Geological Investigations

Volume I



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This report relates 1978-1979 archaeological and geological investigations at Smithville Lake, Clay and Clinton Counties, Missouri. Nine sites were tested or extensively excavated and a survey of recently devegetated paleo-landforms was conducted. Data from the excavated sites provides C14 dates for a Late Woodland occupation (c. 700-900 A.D.). Structural, artifactual, and ecofactual remains from four sites are attributable to Steed-Kisker phase occupation. Two new types of Steed-Kisker settlement-subsistence sites were excavated and identified. Two previously reported Steed-Kisker settlement-subsistence types

were rejected for lack of confirming evidence. Extant hypotheses on the origins, relationships and fate of the Steed-Kisker culture are reviewed and alternative hypotheses are suggested.

Geological investigations produced a model of the terrace sequence and geomorphic history of the valley which, with terrain analysis was used to identify locales of potentially buried Archaic and Early Woodland sites. Investigations indicate that the paucity of Archaic and Early Woodland sites probably relates to the relatively dry climatic conditions in the middle Holocene. Sedimentological data suggest lowered stream discharges and reduced moisture and subsistence possibilities when compared to conditions of the last two millennia.

BEFORE SMITH'S MILL:
ARCHAEOLOGICAL AND GEOLOGICAL INVESTIGATIONS
IN THE LITTLE PLATTE RIVER VALLEY
WESTERN MISSOURI

VOLUME I: TEXT

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(CONTRACT NO. DACW41-78-C-0121)

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JUNE 1982

BEFORE SMITH'S MILL:
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IN THE LITTLE PLATTE RIVER VALLEY,
WESTERN MISSOURI

ABSTRACT

This report relates GAI Consultants, Inc., 1978-1979 archaeological and geological investigations at Smithville Lake, Clay and Clinton Counties, Missouri, for the Corps of Engineers, Kansas City. Nine sites were tested or extensively excavated and a survey of recently devegetated paleo-landforms were conducted. The latter produced 12 newly recorded archaeological sites. Data from the excavated sites provides C14 dates for a Late Woodland occupation (c. 700-900 A.D.). Structural, artifactual, and ecofactual remains from four sites are attributable to the subsequent Steed-Kisker phase occupation. Two new types of Steed-Kisker settlement-subsistence sites were excavated and identified, and two previously reported Steed-Kisker settlement-subsistence types are rejected for lack of confirming evidence. Extant hypotheses on the origins, relationships and fate of the Steed-Kisker culture are reviewed and are found wanting; alternative hypotheses are suggested for testing.

Geological investigations have produced a model of the terrace sequence and geomorphic history of the valley which, in combination with terrain analysis using aerial photographs, was used to identify locales with potentially buried Archaic and Early Woodland sites which seem to be under-represented in the valley. Our investigations indicate that the paucity of Archaic and Early Woodland sites is real and probably relates to relatively dry climatic conditions in the middle Holocene as is indicated by sedimentological data suggesting lowered stream discharges and, by inference, reduced moisture and subsistence possibilities when compared to conditions of the last two millennia.

In the realm of cultural resource management, specific recommendations regarding certain prehistoric archaeological sites are made. In addition, some broader suggestions for managing the cultural resources of Smithville Lake and for a public information program are offered.

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PRECIS

This report describes the results of GAI Consultants' archaeological and geological investigations at Smithville Lake, Clay and Clinton Counties, Missouri, for the Kansas City District, Corps of Engineers. Nine archaeological sites were intensively excavated or tested resulting in substantive additions to the cultural resource data base and to information on the settlement-subsistence system of the late prehistoric Steed-Kisker culture. Earlier cultural horizons were not extensively studied, although several sites produced Late Woodland stage cultural remains (i.e., grit-tempered, cord-marked pottery, projectile points) mixed in with the Steed-Kisker remains. Four C14 determinations on charcoal from two hearths at one site (23 CL 276) securely date a Late Woodland stage occupation to the late 7th to late 8th centuries A.D. (5730 half-life, uncorrected for atmospheric C14 variation). A fifth C14 date from one of the same hearths is apparently 150 to 250 years too recent for the Late Woodland occupation.

The subsequent Steed-Kisker occupation at site 23 CL 276, defined by the presence of abundant, undecorated, shell-tempered pottery (Platte Valley ware), resulted in the construction of a large, nearly square (11.02 m x 11.2 m), cornerless, and roofless structure on a spot that had been largely cleared of cultural debris. The size and form of this structure, its precise measurements, the alignment of the walls close to the cardinal directions, and the absence of storage pits, a central fireplace and quadrilateral roof-supports, all combine to suggest that this structure served a special, nonresidential function. It may have been a community center serving the needs of the dispersed farmsteads of the semi-agrarian Steed-Kisker groups who inhabited the Little Platte River and its tributaries.

Our investigations also revealed a second unusual site, 23 CL 274, 180 m north of site 23 CL 276, which comprised several small, dense concentrations of baked earth, a prepared burned basin, and a shallow refuse dump nearby. This complex is interpreted to be a facility for heating or roasting plant foods, namely maize, _Iva_, and _Chenopodium_, charred seeds of which were recovered from the fill. The absence of evidence for the existence of residential structures or substantial domestic refuse in the immediate vicinity of the roasting facility suggests that this site is also a unique activity node in the Steed-Kisker settlement-subsistence system. Unfortunately, the dating of the Steed-Kisker phase in the Little Platte Valley was not improved by our efforts. Only one charcoal sample from a Steed-Kisker trash pit at another site (23 CL 226) was suitable for C14 assay, but the age determination of 385 +/- 115 years B.P. is too late for this phase.

GAI's geological investigations concentrated on developing an outline of the geological and geomorphological history of the Little Platte valley as a major objective of the program and as an approach to

identifying and testing localities where buried Archaic and Early Woodland sites might be located. Sites of these stages are apparently underrepresented in surface collections. Localities selected on topographic and geomorphic criteria produced 20 places with surface cultural remains, 12 of which were recorded as archaeological sites with the Archaeological Survey of Missouri. The backhoe testing of nine depositional localities revealed two Woodland Period cultural loci. Vegetation in the areas surveyed had been recently removed by the clearing operations leaving partly cleared surfaces for inspection. Colluvial toe-slopes produced the two buried cultural deposits and, consequently, are considered prime areas for deep-testing for buried cultural resources. The geomorphological studies utilizing morphometrics and sedimentological studies contribute a possible explanation for the apparent low density of Archaic and Early Woodland sites in the area, i.e., prolonged drier than average conditions may have reduced the carrying capacity of the district in terms of animal and human populations. Concurrent low discharge rates and reduced competence of the streams militated against the burial of loci of human habitation. This hypothesis is clearly provisional and in need of much more testing.

Other hypotheses relating to the culture history and settlement-subsistence models of the Steed-Kisker phase are examined from the perspective of GAI's findings at Smithville Lake. Based on the data we recovered and our study of extant published data, we offer the following points for discussion;

1. F. A. Calabrese's (1969) hypothesis that the Steed-Kisker culture was the base from which the Nebraska Variant-Doniphan Phase culture evolved is immprobable because of the demonstrable contemporaneity of the two cultural phases, and his failure to demonstrate continuity associated with change in that hypothesized cultural continuum;

2. Certain specific sites of P. J. O'Brien's Steed-Kisker settlement-subsistence system are rejected because one (23 CL 109) is not a <u>unifunctional</u> storage site and two purported burial mounds (23 CL 208, 23 CL 55) are not in fact burial mounds;

3. The Steed-Kisker or Steed-Kisker-like artifactual remains (i.e., ceramics) in the Ozark fringes south and southeast of Kansas City have several possible meanings; we offer alternative hypotheses regarding the relationships between these remains and similar remains in the Kansas City area on both synchronous and non-synchronous levels:

    a. if these widespread manifestations are contempory, they indicate a much larger distribution <u>(oikouemene)</u> for the Steed-Kisker society than is generally acknowledged; conceivably, the settlement-subsistence system of this adaptive mode could include large-scale population movement (transhumance), with a major part of the Steed-Kisker population travelling from the riverine environments of the Kansas City area to the Ozark fringe following the harvest season and returning to the former in the spring;

b. the hypothesis of O'Brien (1978), that the Ozarkian Steed-Kisker manifestations represent late summer and fall hunting expeditions of Kansas City-based groups, fails to address the question of scheduling problems inherent in harvesting horticultural products concurrently with conducting long-distance hunting expeditions;

c. on a non-synchronous level, the Ozarkian Steed-Kisker-like remains could be either earlier or later than the Kansas City area Steed-Kisker sites; if earlier, the origins of the Steed-Kisker culture sensu strictu may be sought in the Ozarkian adaptation and in an interaction with co-existing horticultural groups, either Middle Mississippian or Caddoan; if the Ozarkian Steed-Kisker-like remains are later than the Kansas City Steed-Kisker sites, the former may represent the dispersal of the Steed-Kisker groups from the Kansas City area, perhaps under pressure from more dynamic populations such as those represented by the Nebraska Variant/Culture to the north and the Smoky Hill Phase to the west.

Clearly, the data and perspective from Smithville Lake cannot provide the answers to these problems of regional culture history. They have, however, helped define some other possibilities for future research and have eliminated some of the confusion that has existed regarding the nature of the Steed-Kisker cultural remains and the age of this manifestation in the Kansas City area.

The implications for the cultural resource management program at Smithville Lake have been outlined in an interim report. Recommendations for the testing of specific sites and for the monitoring of others during construction and development on the borderlands of the lake were made. A public education program featuring the results of the archaeological investigations at Smithville Lake has been proposed to include both exhibits at a planned information center and a detailed pamphlet. Finally, the construction of a facsimile of the four-sided structure corresponding to the one evidenced at site 23 CL 276 has been suggested.

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PREFACE

The report following these remarks attempts to accomplish a number of objectives: 1) to fulfill the contract requirements, 2) contribute to the scientific data base in both prehistoric archaeology and in geomorphology-geology, and 3) to enter the scientific discussion of the meaning of the scientific data recovered. From the outset, the project reported herein was focused on certain specific research problems and certain specific sites which were stated in the contract Scope of Work (see Appendix A). In other words, the testing or extensive excavations of these sites was supposed to supply data for answering questions on the settlement system pattern and chronology of the late prehistoric cultural manifestations in the Little Platte Valley. Geological investigations were to develop a model of the geomorphic history of the river valley and provide a means for identifying those locales that had the potential for containing buried Archaic and Early Woodland sites.

All of the specified archaeological sites have been investigated in accordance to the level of intensity stated in the Scope of Work (i.e., extensively excavated or test excavated) or at a greater level of intensity (completely excavated). Two floodplain sites (23 CL 273 and 275) and one small mound (23 CL 208) turned out to be either very or completely unproductive of prehistoric cultural remains; therefore, they were less extensively excavated than they would have been had they contained substantial in situ remains pertinent to the particular problems stated in the Scope of Work. Two sites (23 CL 274 and 276) demanded complete excavation because of their very unusual natures which mark them as distinctive types in the late prehistoric Steed-Kisker settlement-subsistence pattern. Two sites specified for testing (23 CL 229 and 232) as well as for appraisal of the threat of erosion to them were extensively tested over large areas with discouraging results. At one (23 CL 229), in situ prehistoric cultural remains were discovered only when the testing was moved into the aboreal fringe immediately adjacent to the originally designated site area. This discovery led to recommending additional investigation at Site 23 CL 229. The testing of Site 23 CL 279, located near the new dam, was added to GAI's responsibilities when prehistoric artifacts were found eroding out of a recently denuded hillside. Our testing revealed that no cultural deposits remained below the plowzone and that further work is unnecessary at this site. Because it was not part of the original suite of sites and contributed no data pertinent to the research objectives, the investigations at Site 23 CL 279 are reported in a separate appendix (C). The purpose of this brief summary of the sites investigated is to alert the reader to the different contractual requirements posed for the several sites and the varying results that came from the examinations of these sites.

Completion of the contractual requirements for the examination of all specified sites produced a body of artifactual and paleoenvironmental remains that allowed the reconstruction of some aspects of the prehistoric cultural chronology in the area and the identification of two unique Steed-Kisker settlement system types, represented by sites 23 CL 274 and 275 (see Chapter VIII, especially). It is this report, and not the excavations themselves, that contributes to the scientific data base in prehistoric archaeology. The excavated artifactual and ecofactual remains in curation can provide new data only for those willing and able to restudy them. There are undoubtedly more data embedded in these remains but these will be forthcoming only when the collections are re-examined within the context of specific problem orientations. This report then serves the purpose of making some of the data inherent in the recovered cultural materials available for use by others interested in the archaeology of the area.

The final major objective of the project report is achieved through our interpretations of the meaning of the recovered data in terms of the culture history of the region and nature of the late prehistoric Steed-Kisker culture that figures so largely in the later chapters. Not only have we offered novel interpretations for the evidence recovered at two sites, but we have also entered the debate about the nature of the ceramic assemblages that characterize the Steed-Kisker and Late Woodland cultures and the relationship of the Steed-Kisker culture with other cultural manifestations in the Mississippi and Missouri river valleys. Specifically, we have taken issue with the interpretations of two earlier investigators in the Smithville Lake area. We have done this in a conscious and responsible manner, in the hope that this endeavor would contribute not only to the general understanding of the cultural history of the area but would also demonstrate that contract archaeological programs are compatible with scientific research and the expectations of the archaeological profession. We feel that we have met our responsibilities not only to the client but also to the profession. We have been able to do this because of the very substantial help of numerous individuals and several agencies, all of whom are identified below.

ACKNOWLEDGEMENTS

This report is the culmination of over two years of contact and cooperation between the Kansas City District Corps of Engineers and GAI. Because of the close proximity of the project area (Smithville Lake) and the Kansas City office of the Corps of Engineers, monitoring the progress of the field investigations has been at high and beneficial level. Problems that arose in the field were discussed with the Corps of Engineers' personnel and alternatives were quickly found. Site visits by the Corps' representatives were fairly common and always welcome as they provided a substitute for the onerous preparation of weekly or biweekly status reports sometimes required on similar projects. This close contact, we believe, resulted in an appreciation by the Corps' representatives of the nature and the problems associated with archaeological and geological investigations we conducted.

In addition, various services and facilities were made available to GAI by the Corps of Engineers, both during and after the course of the field work. Aerial photographs and small-scale topographic maps of the reservoir were made available for GAI's use during the study. Copying and reproduction of some base maps were provided by the COE Cartographic Section which also prepared the final version of the multicolored map of Site 23 CL 276 (Figure 8-7) that will accompany the published final report. Stream discharge data were supplied for use in our paleogeographic modeling and environmental reconstruction. Copies of reports on other archaeological and cultural resource management projects were provided to us.

An example of the level of cooperation that existed lies in the agreement by the Corps of Engineers to fund the emergency testing of one site (23 CL 279) that was discovered eroding from the edge of a hill due to wave action caused by the temporary creation of a small lake behind Smithville Dam after heavy rains (see Appendix C). The Corps of Engineers also provided the excellent offset reproductions of the artifact photographs (Plates 5-1, 5-2, 6-1 to 6-5) used in the draft final report.

For these and other reasons, GAI Consultants expresses its appreciation to the Corps of Engineers, Kansas City District, and to the necessarily unnamed personnel of that organization who contributed to the success of this project.

We are also pleased to acknowledge with deep appreciation the following individuals who participated in or contributed to this project in one way or another:

Field Supervisors: Gerald Lang, Marc Collier, Alan Paris.

Crew Members: Dennis Falkenburg, Gene Jenkins, Lee Rasmussen, Leonard Bates, Ruth Myers, Arlene Smith, Theresa Baber, Karen Summers, Brad Bailey.

Project Photographer: James Christensen.

Citizens of Smithville and the Smithville Lake Area: Ruben Ross, Frank and Charlie Miller, Buster Summers, James and Lucille Wright, Mrs. Hanks, Charlie and Peggy Taylor, Raymond Porter.

Special Contributors: Marge and Shorty Harris, Edgerton; R. B. Aker, Parkville; J. Mett Shippee, North Kansas City; Helen Bailey; Col. C. C. Kindred.

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Project Illustrator: Patricia Renjifo.

Report Editorial Assistants: Scott McDougall, Ken Kornick, Beverly Mitchum.

Scientific Consultants: Frances King, Illinois State Museum; Carl Falk, Archaeological Research Division, University of Nebraska; Dr. James King, Illinois State Museum; Dr. Bud Rollins, University of Pittsburgh and Dr. David H. Krinsley, Arizona State University.

Project Professional Consultants: Dr. Patricia O'Brien, Kansas State University; Dr. Francis A. Calabrese, Midwest Archaeological Center, U. S. National Park Service, Lincoln, Nebraska; Dr. Dale Henning, Luther College, Decorah, Iowa; Dr. Alfred Johnson, University of Kansas; Dr. Jack Donahue, University of Pittsburgh.

Interested Archaeologists: Dr. Donald Blakeslee, Wichita State University; John Ludwickson and Gayle Carlson, Nebraska Historical Society; Tom Thiessen, Midwest Archaeological Center, NPS, Lincoln, Nebraska; Terry Steinacher.

We would like to single out one individual for very special thanks. She is Jill Schroeder, secretary and general assistant in the Smithville office. She was super; we hope our paths cross again.

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CHAPTER I

BACKGROUND OF THE INVESTIGATIONS: THE SCOPE OF WORK AND GAI CONSULTANTS' PROPOSAL, PROGRAM, AND ORGANIZATION

INTRODUCTION

The purposes of this chapter are to present GAI Consultants' proposal to meet the requirements of the Scope of Work with the Corps of Engineers and to sketch the chronology of activities by which we accomplished the objectives of the Scope of Work. Our proposal outlines the general methodology guiding our investigations and the specific approaches we planned to employ in both the archaeological and geological components. In addition, the proposal presents an outline of the culture history of the area and identifies the limits and limitations of this project. It also includes some recommendations for introducing a degree of flexibility into the required investigations in order to meet unforseen contingencies and to broaden the culture-historical aspects of the program. For comparison, a copy of the contract Scope of Work is included as Appendix A.

The chronology of activities identifies the major participants in this undertaking and the organization that evolved to complete the task. These contributors and others are listed in a separate acknowledgements section that precedes this chapter.

REQUIREMENTS OF THE SCOPE OF WORK

Our understanding of the Corps of Engineers' Scope of Work for the Smithville Lake project is reflected in the following section.

<u>General</u>

Scientific excavation and/or testing of specified sites, the analysis of materials recovered, the preparation of a report embodying the results of the research which is of value to other researchers, and proper curation of the recovered materials.

<u>Specific</u> (not in the same order as the original Scope of Work)

1. Excavation and/or testing of known sites:

    a. Extensive excavation of Sites 23 CL 208, 225, and 226;

    b. Testing of Sites 23 CL 229 and 232.

2. Location of unknown but hypothesized single component Archaic and Early Woodland sites. As sites from the pre-Christian era are unreported for the Smithville Lake area, excepting those which were

subsequently occupied by Middle Woodland or Mississippian societies, a program of searching for such sites is specifically required. A technique involving the subsurface sampling of selected localities by coring is recommended for discovering the hypothesized sites.

3. Conduct geomorphological studies to:

   a. Delineate the terrace sequence (depositional-erosional history of the drainage system) and to locate those locales where buried archaeological sites may be found; and

   b. Determine the nature and extent of erosion which has affected or is likely to affect the surface sites (listed above) under investigation.

In addition to the above listed specific requirements, the Scope of Work also identified the following goals for the Smithville Lake research project:

1 An outline of study goals for the Late Woodland Site, 23 CL 226;

2. Refine the Steed-Kisker cultural chronology and settlement pattern hypotheses of O'Brien through investigation of Sites 23 CL 208 and 225;

3 Recover the skeletal remains from Site 23 CL 208 by an individual competent in their preservation and in the study of human osteology for the production of osteological data for comparison with that from the Chester Reeves Mound (23 CL 108);

4. Test excavate Sites 23 CL 229 and 232,

   a. To determine if they merit further excavation <u>if</u> they will be adversely affected by the fluctuating lake level in the future.

   b. To produce information on the "placement" of these in the Steed-Kisker settlement pattern.

5. Provide a discussion of the paleoenvironment.

6. Examine all recovered cultural remains and include a description of these in the final report.

7. Include in the lithic analysis a study of the chert-types recovered in the site excavations and testing. [This requirement was deleted by mutual agreement with the recommendation made by Michael Weichman, Senior Archaeologist, Missouri Department of Natural Resources.]

The above listed general and specific requirements and goals of the Corps of Engineers' Scope of Work derive largely from Patricia O'Brien's (1977) recommendations which are presented below to provide the broader context on which our research design is based.

O'Brien's Recommendations

Dr. Patricia O'Brien (1977; 103 ff. and 230-1) identified the following needs and made the following recommendations for further archaeological and ancillary studies in the Smithville Lake area:

1. Data on the Archaic stage archaeological sites is needed.

   a. Dr. O'Brien recommended testing of Site 23 CL 117 along Mitchell Branch in the southernmost part of the reservoir borderlands (this site was not listed for testing in the Scope of Work).

   b. Geomorphological studies to locate buried Archaic sites.

2. Extensive testing of 23 CL 226 to provide data on the Late Woodland cultural stage in the area.

3. Attempt to reconcile O'Brien's model of the Steed-Kisker system (i.e., a series of family farmsteads with nearby cemeteries and storage and plant processing loci) with the postulated anomalous situation represented by Sites CL 229, 231, and 232 along Camp Branch. Why these sites represent an anomaly is not made clear and needs to be checked and investigated with Dr. O'Brien. In addition, the strong possibility that Sites CL 229 and 232, located in the fluctuating pool zone, will be adversely affected by erosion warrants their testing in order to determine if further investigations will be needed.

4. Excavate Site 23 CL 225, a hypothesized series of Steed-Kisker farmsteads, in order to:

   a. Refine the Steed-Kisker chronological sequence; and

   b. Determine its relation to the previously excavated Friend and Foe Site, 23 CL 113 (Calabrese 1969) nearby.

5. Excavate Site 23 CL 208, a possible burial mound which may have been the cemetery for the inhabitants of the CL 225 farmstead complex about 0.5 km east.

6. O'Brien (1977:105) also noted that a series of sites in southern Clinton County, 23 CI 35, 36, and 37, another hypothesized farmstead complex, would be affected (inundated) by the Smithville Lake, but made no specific recommendations regarding their investigation.

7. O'Brien also recommended that the remaining lands along Camp Branch acquired by the Corps of Engineers subsequent to her work be surveyed.

Additional recommendations made by three outside reviewers which have affected the Scope of Work are outlined in the following section.

Reviewers' Recommendations

O'Brien's preliminary 1977 report was sent to three professional archaeologists for evaluation. These reviewers were Dr. Alfred Johnson, University of Kansas, Dr. Dale Henning, University of Nebraska, and Dr. Donna Roper, University of Missouri. Their reviews were included as Appendix II along with O'Brien's responses. Since these reviews have had an impact on the Corps of Engineers' Scope of Work, they will be briefly considered here.

The major criticism of Johnson's review was that he was not satisfied that the results of O'Brien's research contributed to the solution of the problems she set out to investigate. Johnson found that O'Brien failed to develop a demographic model of the Steed-Kisker population or a model of the environment at Steed-Kisker times. He suggested some rewriting of both the problem statements and the results.

Both Henning and Roper note the absence of a Scope of Work for the investigations undertaken by O'Brien whose response was that "none was developed" (1977: 183). Henning asks what procedures were followed and what were the reasons for selecting specific sites for excavation, and were these excavations worth the time and the money expended on them. If further mitigation is to be undertaken, Henning specifically recommended the need for 1) geomorphological studies to determine the terrace sequence, 2) a program of subsurface testing by trenching or coring to locate buried sites, and 3) the consultation of a competent soils specialist who would work in the field during the investigations of the archaeological sites yet to be studied.

Roper feels O'Brien's work only partially fulfilled the requirements of modern professional archaeology. Roper approves of O'Brien's attempt to develop an areal cultural chronology, but takes issue with O'Brien's statements about 1) developing a "demographic model" describing patterns of Steed-Kisker culture, and 2) developing a model relating the nutritional and pathological conditions of Steed-Kisker peoples to the inferred environment. In sum, Roper finds O'Brien's overall problem orientation inadequate since the survey was conducted without any explicit problem orientation and the only problem statement acceptable to Roper pertained to a mere 300 years of a 10,000 year cultural sequence.

Roper finds O'Brien's recommendations for additional research "most reasonable," especially the attempt to discover and date Archaic sites. Specifically Roper encourages the testing of Site 23 CL 117, a likely Archaic site in the southernmost part of the reservoir to determine if larger scale excavations are needed. (This site is not recommended for testing in the Scope of Work.) Roper also sees merit in using a geomorphologist to study the reservoir basin and to aid in locating deposits likely to contain buried Archaic sites. Roper notes that for the excavation of the Late Woodland site (23 CL 226) to be profitable, some "trial explanations" of the Late Woodland stage should be formulated, that is, a problem orientation needs to be developed to which the investigations at Site 23 CL 226 can contribute. Roper agrees that additional work on the Steed-Kisker sites is warranted and urges that

O'Brien's recommendations on this matter be seriously considered. Roper's lesser criticisms and suggestions will not be related here except to note that the one concerning the need for studies on chert-type utilization is reflected in the Scope of Work.

The Corps of Engineers' Scope of Work is based on the recommendations of O'Brien and the three outside reviewers. However, the reviewer's recommendations go somewhat beyond the requirements of the Scope of Work and where they do, these will figure in the research design which will be the basis of our program of investigation.

PREVIOUS ARCHAEOLOGICAL RESEARCH IN THE SMITHVILLE LAKE AREA

Institutionally based archaeological research in the Smithville Lake area began in 1967 with the University of Missouri Archaeological Research survey under the supervision of Dr. W. R. Wood. The field survey was conducted by Rolland Pangborn and Marvin Kay in January, March, and April and by Thomas Riley in June and July (Riley 1967:2). Twenty-three sites were discovered and one site, 23 CL 113, was partially excavated under Riley's direction. Riley noted that most sites tended to be late in the prehistoric sequence with Archaic and Woodland remains being scarce and Paleo-Indian remains entirely missing. Most sites, Riley felt, pertained to the late horticultural, semi-sedentary groups who occupied the area after about A.D. 1000 and until A.D. 1200 or later. He believed that investigation of these sites could contribute to clarifying the culture history of northwest Missouri along the boundary of the Central Plains.

In 1968, F. A. Calabrese directed the University of Missouri field work in the Smithville Lake area, resuming excavations at 23 CL 113 (the Friend and Foe site) and initiating excavations at 23 CL 118 (the Butcher site). Calabrese had the goals of demonstrating the relationships of the Little Platte Valley Mississippian sites with those of the Missouri River Valley near Kansas City and to suggest the western Mississippian (Steed-Kisker complex) origins of the Doniphan phase of the Nebraska variant of the late prehistoric Central Plains culture (1969:2). Calabrese concludes that a "genetic relationship" existed between the Friend and Foe site and the Steed-Kisker complex and that the Doniphan phase was "derived from the Mississippian base present in the Kansas City and surrounding areas" (1969:219). Calabrese emphasized that his conclusions were hypotheses which needed testing through further excavations and reanalysis of existing site collections.

In 1969, Calabrese along with R. Vehik continued the archaeological investigations in the Smithville Lake area in order "to provide additional information about structural remains, community patterns, and to a lesser degree, settlement patterns of the Middle Mississippian occupation in the Little Platte Valley" (Calabrese 1974:1). Four sites were tested and/or excavated, two in Clay County (23 CL 118 and 119), and two in Clinton County (23 CI 14 and 16). The 1969 excavations

produced less than the desired results due to heavy rains and impoverished archaeological sites. No well-defined house patterns were found and artifact samples were small although similar to the Kansas City Mississippian assemblages. Radiometric assays placed these sites in the 10th and 11th centuries A.D. Calabrese concluded that more work was needed on the Mississippian sites and that additional intensive site surveys were needed in the Smithville area.

By 1969, part of the Smithville Lake had been surveyed for prehistoric archaeological sites and a number of them had been excavated or tested. This work is summarized in the following table.

SUMMARY OF ARCHAEOLOGICAL FIELD WORK THROUGH 1969

	Clay County		Clinton County	
Sites	Discovered	Tested or Excavated	Discovered	Tested or Excavated
1967	14(CL 104-117)	1(CL 113)	9(CI 12-20)	-
1968	-	2(CL 113, 118)	-	-
1969	-	2(CL 118, 119)	-	2(CI 14,16)

Archaeological investigations in the Smithville Lake area lapsed until 1975, when Dr. Patricia O'Brien, Kansas State University, under contract to the U. S. Army Corps of Engineers, began a series of surveys of the lands within the proposed lake area and associated public land use areas and some test excavations of selected archaeological sites. The 1975 site survey was coordinated by Kevin B. Cooprider and was carried out using two, two-person teams comprised of an experienced surveyor and a student (from the archaeological field school which was running concurrently).

In two volumes, O'Brien (1976a, 1976b) detailed the results of her first two season's survey work and these were summarized in her 1977 draft report (main section and Appendix IV). O'Brien reported, tract by tract, the nature of the vegetation cover encountered in the surveys and how it affected the survey results. Sites were assigned the standard designations and a brief description of each of them is presented in one or another of O'Brien's reports.

Excavations were conducted concurrently with the field survey. In her April 1976 report, O'Brien (1977: Appendix III) said that the original plan was to excavate sites 23 CL 109 and 114 with the field school students. When CL 114 proved to be nearly sterile and Site CL 109 became inaccessible, the plans were altered to undertake test excavations at Sites CL 108, 115, and 195 (ibid.:190). O'Brien found the

results of the excavations at these three sites disappointing due to the thinness of the cultural deposits and the sparcity of artifactual remains. She concluded that inundation would not harm these sites since "significant data on occupational characteristics and site function has since been irretrieveably lost" from a century of plowing and surface collecting (ibid.:207).

Limited excavations were conducted on the Chester Reeves site, a burial mound of Steed-Kisker affiliation, characterized as having the potential for contributing information on "demography, nutrition, disease and general pathology of Steed-Kisker peoples" (ibid.:207). O'Brien recommended completing the excavation of this mound from which six burials were taken in 1975.

In her report of February 1976, O'Brien (1977: Appendix IV) summarized the results of the 1975 site survey program. She noted that 15 sites had been discovered along Camp Branch, nine of which were prehistoric. Because of its multiple component nature, Site 23 CL 195 was excavated; however, extensive excavation, trenching, and coring proved that all the cultural materials came exclusively from the plow zone.

In the summer of 1976, O'Brien again directed the Kansas State program in the Smithville Lake area. A major effort was made to complete the excavations of the burial mound, 23 CL 108, and another 24 burials were recovered. Dr. Michael Finnegan, a physical anthropologist and human osteologist, joined the field program and participated in the mound excavation; Finnegan completed the excavation in the spring of 1977, when four more burials were recovered. Other sites tested or excavated in 1976 include CL 109, a multi-component site and CL 199, a purported late Kansas City Hopewell site. Brief descriptions of the site excavations are included in O'Brien's 1977 draft report (main section).

In the same volume, O'Brien reported the results of the 1976 site survey program (1977:6-16). Fifty-three additional sites had been found, 18 in Clay County and 35 in Clinton County. This brought the recorded number of sites in the Smithville Lake to 110, 18 of uncertain prehistoric cultural affiliation and 13 designated as historic (ibid.:19). Thus, due to the programs directed by O'Brien, the number of recorded archaeological sites were increased considerably for the Smithville Lake area, from 14 to 66 for Clay County and from 9 to 44 for Clinton County.

In summary, the Smithville Lake area has been the focus of six seasons of institutionally-based archaeological field research; in 1967-68-69 by the University of Missouri, and in 1975-76-77 by Kansas State University. Over a hundred sites have been discovered and recorded as to location, nature of surface materials, and preliminary cultural assignment. Eleven sites have been tested or more thoroughly excavated. Most of the excavated sites belong to the most recent part of the cultural sequence, the Steed-Kisker focus, although a Middle Woodland-Kansas City Hopewell site (or component) was also excavated. Given the intensive nature of the site surveys which have been conducted in the Smithville Project and the limited program of site testing and excavation, the stage is now set for the completion of archaeological

research in this area. The research design for such a proposed program is presented in the following pages.

GEOMORPHOLOGICAL AND GEOCHRONOLOGICAL INVESTIGATIONS

Introduction

The Little Platte River within the area of Smithville Lake Project is a drainage which has been affected by four major glacial stages (Nebraskan, Kansan, Illinoian, and Wisconsinan). Glacial ice extended into the area during Nebraskan and Kansan times (Holmes 1942, Fry and Leonard 1952). The present drainage pattern was established in post-Nebraskan time.[1] The Illinoian and Wisconsinan glacial stages were undoubtedly times of alluviation with generation of terraces. Additionally, aeolian loess deposits were generated during glacial stages (Flint 1957). Interglacial stages (Aftonian, Yarmouth, Sangamon, and Holocene) are generally represented by weathering and development of soil profiles.

Research Design

A geomorphologic evaluation of the Little Platte drainage, especially in the context of interpreting the paleoenvironments of prehistoric archaeological sites and testing for possible subsurface sites, demands a detailed understanding of the drainage system as well as depositional and erosional processes operating within the drainage. Some information can be derived from examination of available maps and photos as well as field observation of geomorphic features. A detailed synthesis, however, can only be derived from an extensive subsurface sampling program involving backhoe trenches and coring. Laboratory analysis is then essential to quantify and elaborate field observations.

A number of problems are involved in developing an interdisciplinary approach to the Smithville Lake archaeological program. The number, relative ages, and areal extent of alluvial terraces within the drainage must be defined (Strahler 1960). Only upper Wisconsin and Holocene terraces have the potential of containing artifactual material.[2] The characteristics and areal distribution of these younger strata must be delineated and separated from older sterile sediments. Molluscs and especially gastropods are invaluable aids in establishing relative ages and also in making paleo-environmental interpretations (Miller 1960, 1966).

Three processes were responsible for depositing sediments within the Little Platte drainage during Pleistocene and Holocene times. Glacial deposits were implaced during Nebraskan and Kansan times and are now present as till sheets with overlying weathered gumbo till horizons. Both field and laboratory analyses can be used to distinguish this material (Reineck and Singh 1973:180).

The deposition of aeolian loess deposits, a well-sorted, silt-sized sediment, is also associated with glacial stages. In the Little Platte drainage, the potential exists for four periods of loess deposition, associated with the four glacial maxima. The presence of loess can be successfully determined by field examination and especially by laboratory analysis using grain size determinations and surface texture examination via scanning electron microscopy (Kingsley and Doornkamp 1973).

Alluvial sedimentation has been the predominant process in the Little Platte drainage since Yarmouthian time (post-Nebraskan). Determination of alluvial subenvironments (channel, levee, floodplain, etc.) will require both field observation and laboratory analysis (Reineck and Singh 1973:229). Since weathering and erosion operate concurrently with alluviation, it will be necessary to examine backhoe trenches in order to develop a three-dimensional depositional model. A suite of laboratory analyses will be necessary to identify and correlate depositional sets (Visher 1972). Grain-size, composition, and heavy mineral analyses will be used to identify and correlate each depositional unit. Paleontological criteria can be used to establish relative age and depositional environment. Submicroscopic textures and degree of weathering on grain surfaces can be established via scanning electron microscopy. This technique will aid in delimiting relative ages of depositions.

An especially detailed examination of the youngest units will be necessary for integration with the archaeological program. Holocene history of the drainage involves both depositional and erosional sequences. The Little Platte River has developed a meandering pattern with generation of a narrow floodplain. The river channel and associated floodplain has undoubtedly migrated repeatedly during Holocene time (Strahler 1960:351). The above research plan is critical in establishing an accurate three-dimensional model which can then be used in making specific paleo-environmental interpretations of the archaeological contexts. The model will also be utilized in predicting the location of subsurface archaeological sites which will then be sought using a coring technique.

Methodology

The research design calls for a number of logical steps to be used in defining terrace sequences along the Little Platte River and relating them to known surface and possible subsurface archaeological sites.

Phase 1 consists of examination of available literature, topographic maps, Soil Conservation Service data and maps, Corps of Engineers' subsurface data, air photos, and remote sensing imagery. This will permit generation of a preliminary regional picture with a rough out of at least major alluvial terrace levels for the drainage system. Concurrently, available archaeological data, especially site locations, will be examined in order to integrate this with the developing regional picture. Readily available material will be gathered from the Pittsburgh area. Then it will be necessary to visit universities and state and federal agencies in Missouri, Iowa, Kansas, Nebraska, and South Dakota to gather materials available in these institutions and agencies and to interview individuals with detailed field experience.

Phase II consists of initial area reconnaissance. A detailed field examination will be carried out in the drainage area which will be affected by the Smithville Lake. At this point, the magnitude of the geological testing program will be planned by preliminary mapping of alluvial terraces. Stream and road cuts through the alluvium as well as surface expressions of terrace levels will be used to define a probable terrace sequence in the region. Onsite examination will allow location of the optimal number of geological test trenches necessary to define a detailed alluvial history for the drainage. We will also establish a preliminary picture of the types and magnitude of laboratory tests necessary to document and magnify field observations. We will necessarily concentrate on more recent alluvial sediments which have the potential of containing artifactual materials.

Phase III involves meeting in the field with the archaeologists involved in the project to coordinate archaeological and geological testing. For maximum efficiency, we will utilize as many backhoe trenches as possible for the collection of both archaeological and geological data. Integration with the archaeological program at this time will result in a finalized plan for positioning of the geologic test trenches. We will also develop preliminary strategies for locating subsurface archaeological sites within the alluvial sediments.

Phase IV involves actual excavation of geological test trenches by means of a backhoe. An estimated 100 trenches will be carefully spaced over the reservoir area. The standard procedure will be to field classify and plot distributions of alluvial sediment types within each trench. Grain-size analyses will be processed at an onsite laboratory to aid in classification. Additional samples will be obtained for grain compositions, heavy mineral analysis, scanning electron microscopy, and paleontologic analysis. The latter samples will be processed in Pittsburgh and used for correlation and relative age determinations within the alluvial sediment sequence.

As test trench samples become available, it will be possible to generate a preliminary areal distribution pattern for the alluvial sequence. As depositional patterns for the drainage become apparent, both additional backhoe trenching and coring will be carried out in an effort to locate subsurface archaeological sites.

Concurrent with these phases, archaeological excavations will have been underway. Site-specific geological investigations of the archaeological sites and their locales will be conducted by staff geologists in order to:

1. Determine the original physical setting for each site location;

2. Determine the depositional and erosional history of each site as an aid to cultural interpretation;

3. Assess the factors which have affected the sites since their abandonment;

4. Attempt to estimate the differences in intersite and intrasite occupational intensity through chemical tests conducted on site soil samples; and

5. Aid in removing burned hearth samples for archaeomagnetic assays and age estimates.

The above goals will be pursued by studying aerial photographs and topographic maps of the site locales, by compiling available soil data, by mapping the surface of each site and its surroundings, by establishing their subsurface stratigraphy using test pits, trenches, and auger holes, and by taking soil samples for sediment analyses, chemical tests, and pollen extraction. Such investigations should "feed-back" into the geological studies of the alluvial deposits and contribute to the subprogram designed to discover the buried archaeological sites.

The site-specific and surficial geological studies will contribute significantly to our discussion of paleo-environmental conditions which prevailed in the Upper Little Platte Valley in post-Pleistocene times. The following Figure 1 depicts our plan for integrating the geological and archaeological studies which we will conduct in the Smithville Lake area.

Phase V involves laboratory analysis of samples collected during geological testing. Grain composition and heavy mineral analyses will be conducted at GAI laboratories. Scanning electron microscopy and paleontologic analysis will be handled by consultants at Arizona State University (Dr. David Krinsley) and the University of Pittsburgh (Dr. Harold Rollins). The above analyses will provide quantitative data and will confirm field observations on relative ages of terrace sequences within the drainage as well as contributing to the interpretation of depositional environments for alluvial sediments especially at the archaeological sites. Analysis will be done on an as-needed basis. Samples for analysis will be selected as field work proceeds and a geomorphological framework is established.

ARCHAEOLOGICAL INVESTIGATIONS: PROBLEMS IN THE CULTURE HISTORY AND CULTURAL ECOLOGY OF THE LITTLE PLATTE VALLEY

Introduction

The general problems related to the prehistoric human adaptation in the Little Platte River Valley can be stated as follows:

1. The cultural chronology, that is, the sequence of different cultural units in time, is only partially known; for instance, no evidence of Paleo-Indian occupation is reported and Early Archaic and Early Woodland manifestations are not reported.

2. The precise nature of the adaptive modes of the prehistoric inhabitants and changes in these adaptive patterns through time is incompletely known; only by comparison with finds in other areas

can the presumed economic practices of the Little Platte Valley prehistoric cultural stages be hypothesized; direct evidence of these practices is generally lacking.

3. Relationships between the prehistoric peoples of the Little Platte Valley and other areas are assumed but have not been systematically investigated; therefore, cultural developments within the area cannot be fully understood although the area is generally seen as being marginal to developments taking place elsewhere.

It would be presumptious to suggest that the research program proposed herein will fully alleviate the deficiencies in our knowledge of prehistoric cultural adaptations and paleogeographic conditions in the Little Platte River drainage. The subsequent sections will identify the specific problem areas to which we feel we have a reasonable chance to contribute data. The problem areas will be organized according to the cultural chronology as it is now understood, beginning with the Archaic stage (in the absence of Paleo-Indian manifestations) and ending with the late prehistoric Steed-Kisker complex.

The cultural chronology of the Little Platte River Valley has been developed through investigations within the drainage which have identified various cultural units (e.g., Late Archaic, Kansas City Hopewell, Steed-Kisker, etc.) some of which have been fixed in time through radiometric dating (Steed-Kisker), and others of which have been relatively dated by comparison with sequences known from other areas. If we are to deal with the problems of cultural change in the Little Platte Valley, we need to discover all the cultural manifestations present in the area and be able to date them, relatively or absolutely, independent of comparisons with other areas. To order the cultural units of an area by comparison with those of known order from another area and then discuss cultural interactions between these areas or of influence going from one to the other area is a traditional procedure, admittedly, but inherently circular. These problems will be addressed by this research design.

The Archaic Stage

Sites with Archaic stage (Middle and Late) components, ranging in age from approximately 5000 or 4000 B.C. to 1000 B.C., have been reported for the Smithville Lake area (O'Brien 1976a, 1976b, 1977), but most have components of other cultural units. Our program, through the study of the hydro-geomorphology of the Little Platte River will attempt to delimit the Holocene erosional-depositional history of the valley and will, if successful, contribute to the discovery and ordering (dating) of the buried Archaic and Early Woodland sites. Discovery and investigation of these buried sites will contribute information on the adaptive modes of the Archaic and Early Woodland populations (on their economic systems, their technology, their settlement patterns, etc.), thereby outlining cultural developments covering some 4,000 years or more. The geomorphological studies, comprising investigations of the terrace sequence and the physical environments of the archaeological sites investigated, will aid in dating the sites and in understanding the

geographic conditions to which the site inhabitants were adapted. Such studies are essential to a comprehensive cultural ecological approach to the problems of past human adaptations.

The Early Woodland Stage

Sites of the Early Woodland stage will also be sought through our program of trenching and coring in selected alluvial deposits. Again, further study will raise the potential for elucidation of the cultural stage in terms of human cultural adaptation and change in the last millennia B.C. and prior to the appearance in this area of the Kansas City Hopewell culture of the next period.

The Middle Woodland Stage

Without knowing the nature of the Early Woodland adaptation, we cannot assess the significance of the apparent developments marked by the entry of the Kansas City Hopewell manifestation with its clear implication of Mississippi Valley contacts or origination. O'Brien (1977:29 ff.) excavated a Kansas City Hopewell site (23 CL 199) on Camp Branch Creek in the southern part of the Smithville Lake area only to find it disappointing in terms of the materials and information it provided about the K. C. Hopewell stage. The site was, O'Brien concluded, a simple "unifunctional" locus devoted primarily, she hypothesized, to the storage and/or processing of wild plants. In view of the minimal existing data from the Kansas City Hopewell in the Little Platte drainage, it is clear more investigations are in order.

The Late Woodland Stage

The Scope of Work requires the development of study goals to guide the excavation of Site 23 CL 226, a site with purported Late Woodland and Euro-American components. Perhaps, it would be best to pose some basic questions regarding this stage for otherwise we will probably obtain simplistic answers to complex questions. Such questions are:

1. What is the cultural content of CL 226 and why is it assigned to the Late Woodland culture stage? To what time period does CL 226 belong and is this compatible with a Late Woodland identification? Can this site be dated by radiometric and/or other means?

2. What is the economic base of the Late Woodland inhabitants of 23 CL 226 as determined through the study of their refuse, material remains, catchment area, and the paleogeographic conditions which prevailed at the time of site occupations?

3. What is the nature of community patterning, that is, the intrasite spatial arrangement of living quarters and other facilities, etc.?

4. Does the Late Woodland component exhibit evidence of continuity from the previous cultural stage and does it show signs in its

material culture (pottery, tool types), settlement patterns, and other aspects of culture anticipating the subsequent Mississippian Steed-Kisker adaptation?

5. Can we determine if the Late Woodland adaptation exhibits a conversion from intensive exploitation of wild plant resources and wild game to at least an incipient reliance on maize horticulture?

The Mississippian Stage

The Mississippian stage culture in the Little Platte Valley is known as the Steed-Kisker culture (O'Brien 1977). Radiometric assays suggest a temporal range of a few centuries, from about A.D. 900 to A.D. 1300 (Calabrese 1969:212-216; O'Brien 1977:52, 82, 92). The Steed-Kisker sites have been the major focus of archaeological investigation within the Smithville Lake area. Yet there are still important unresolved questions related to this culture. The Scope of Work, as mentioned, specifies the extensive excavations of the apparent Steed-Kisker sites, 23 CL 225 and 208 and the testing of 23 CL 229 and 232. O'Brien (1977:10, 105) has proposed that CL 225 is a multi-loci settlement, a series of "farmsteads" strung along the west bank of the Little Platte River (see Figure 4-1). She suggested that the examination of these loci would contribute to testing her model of the Steed-Kisker settlement system in addition to determining more precisely the chronology of the Steed-Kisker development in this area.

Some basic questions to raise regarding the Steed-Kisker adaptation in the Little Platte Valley are:

1. Are the multiple loci of Site CL 225 similar or different in cultural content, internal organization, situation, etc.? Are they similar enough to have had identical purposes or are different functions such as habitation, storage, food processing, etc., indicated?

2. Can some of the multiple loci of CL 225 be considered "farmsteads," as O'Brien believes, and how can this be demonstrated archaeologically? If some of these loci are "farmsteads," what is the evidence of horticultural activity taking place there? Does the concept of "farmstead" imply the existence of some other kind(s) of settlement units such as small villages or towns? The "farmstead" concept would seem to imply a spatially dispersed population existing at the same time within a limited area. What principles and factors (social, economic, geographic) account for the observed degree of dispersal? What factors tie the members of the different "farmsteads" together? What relations do members of "farmstead" clusters have with members of other nearby or more distant clusters? Are they likely to be organized at the band, tribal, or chiefdom level of socio-cultural integration? Without promising to answer all these various questions, our research program will attempt to provide information which can be employed in the construction of the Steed-Kisker settlement system through time in the Little Platte Valley.

3. Site 23 CL 208 is a postulated burial mound, the possible cemetery of the folks who occupied the CL 225 "farmsteads" (O'Brien 1977:10, 105). What evidence can be used to demonstrate that such a possible relationship is tenable? If ceramics accompany the burials, these may be compared with those of the "farmsteads" to appraise this hypothesis. Radiometric dates from each site should be obtained; these might show that CL 225 and 208 date to the same period in which case the hypothesis would still be tenable. Incompatible C14 dates would cause rejection of the hypothesis, of course. If we could demonstrate that the inhabitants of the "farmsteads" and the cemetery population were both maize eaters, the hypothetical connection would remain viable. How? Flotation techniques may recover botanical remains of maize from the "farmstead" loci which would be presumptive evidence for maize consumption by their inhabitants. Maize consumption is reflected in the osteogenesis of humans according to a recent article by Vogel and Van Der Merwe (1977). They report that the differential metabolism of atmospheric carbon isotopes (C12, C13, C14) by growing maize (see Hall 1967) alters the atmospheric proportions of these isotopes. Apparently, this aberration is acquired and maintained in the osteological tissues of maize-dependent populations. We will test the osteological remains from Site CL 208 for this phenomena by submitting samples for appropriate examination. We recognize that confirmation of the other than atmospheric proportions of carbon isotopes within the cemetery population will neither conclusively prove they were unequivocally maize-eaters in life nor that they lived in the CL 225 "farmsteads." Nevertheless, the approach is a reasonable research strategy and will be employed in our program.

4. A final matter for consideration relating to the Steed-Kisker adaptation in the Little Platte Valley is the question of its relationship to the allegedly similar and roughly contemporary cultural manifestations in the Missouri River Valley. This question has been addressed by Calabrese (1969:2) who proposed that the two sites, 23 CL 113 (the Friend and Foe site) and 23 CL 118 (the Butcher site) are "genetically related to the Steed-Kisker Focus of the Kansas City area and to components of the nearby Doniphan [County, northeast Kansas] phase of the Nebraska variant" on the basis of shared similarities in village patterns, house distributions, artifact types and hunting patterns.

   O'Brien has subsummed the above two sites and Sites 23 CL 208, 225, 229, and 232 within the Steed-Kisker complex without, however, providing full documentation for this assignment in her technical reports on Smithville Lake research. In other words, the precise comparisons between the various ceramics, lithics, other cultural remains, etc. have not been reported. Neither the the debate on Doniphan phase origins, nor the origins of the northwestern Missouri-eastern Kansas and Nebraska horticultural adaptation, are our primary focus; however, we do intend to extract and report as much data pertinent to this discussion as we can so other scholars will be able to employ this data for scientific purposes. Our methodology and organization for accomplishing these goals are outlined below.

Methodology

The archaeological field investigation required by the Scope of Work includes the extensive excavations of the following sites: 23 CL 208, a possible Steed-Kisker burial mound; 23 CL 225, actually a series of eight loci each located several hundred feet from each other along the west bank of the Little Platte (a possible Steed-Kisker farmstead complex); and 23 CL 226, a Late Woodland site. Sites 23 CL 229 and 232 are two possible Steed-Kisker sites along Camp Branch which are to be tested.

Field techniques to be employed for site examination will include:

1. Topographic mapping of the sites and tieing the sites to U.S.G.S. quadrangles.

2. Examination of the surface of sites to record distribution of cultural materials and plot apparent size of site.

3. Execute a program of systematic subsurface sampling controlled by a grid system to ascertain if undisturbed cultural deposits exist and where these are located.

4. Expand the excavation in areas with proven or potential *in situ* cultural remains to maximize recovery of cultural (artifacts, features) and organic (faunal, botanical) materials which will contribute to characterizing the intrasite patterning, technology, and economic base of the site occupants.

5. Exposure and recovery techniques will include shovel testing and removal where feasible, trowelling, brushing and other finely controlled techniques on burials, and other features (post molds, storage/refuse pits, hearths, etc.), screening of all excavated deposits through at least 1/4-inch metal fabric and selected deposits through much finer mesh fabric (dry screening for microlithic and floral and faunal remains). We will also employ flotation extraction techniques on selected samples using a locally-built apparatus of proven design.

6. Since we can only anticipate the surface condition of the sites to be investigated and assume they will not be in crops but will probably be grown up in weeds, grass, and brush, the sites may have to be bush-hogged and cleared of vegetation by raking and plowing. This will be determined early in the field season and rental of equipment arranged.

7. Geomorphic studies of the archaeological sites will be conducted during the periods they are being excavated. This will involve examination of wall profiles to determine site stratigraphy, field classification of site soils and sediments, and taking of soil samples for subsequent laboratory testing.

8. Recovered artifactual, floral, and faunal materials will be immediately recorded as to provenience, catalogued, and stored for

study. Laboratory analysis of artifactual remains will progress concurrently with field work; final analyses will follow upon completion of the field investigation. Concurrent artifact analysis will provide our staff familiarity with the cultural and biological contents of the sites and will permit us to successively adjust our field tactics to better meet the research goals.

9. Carefully selected specimens of wood or charcoal will be collected and prepared for radio-metric determination. As we are charged with refining the Steed-Kisker chronology and will test or extensively excavate four possible Steed-Kisker sites (CL 208, 225 with 8 loci, 229, and 232(and one Late Woodland site (CL 226), we anticipate submission of 24 samples for C14 dating (e.g., 208-3, 225-12, 229-3, 232-3, 226-3). Twenty-four new C14 determinations will increase those already available from the Smithville Lake area to 39 (Calabrese 1969:213 ff., Figure 13; O'Brien 1977:52, 82, 92).

10. Excavations of CL 208, a possible burial mound, will be conducted with great attention to determining the stages of mound construction and burial chronology. We anticipate, on the basis of conditions encountered at 23 CL 108, the Chester Reeves Mound, that skeletal remains will be poorly preserved thus necessitating extreme care in excavation techniques and recording procedures and the ability to immediately employ appropriate preservation measures. As mentioned above, some human bone will be submitted for analysis of C-isotope composition to determine if the buried individuals might have belonged to a maize-eating population. Specimens so tested will have to be treated differently from the skeletal remains, treated to insure their preservation for morphological study. The osteological (metric, genetic, pathological) study of the skeletal remains will be conducted following the field work.

11. Laboratory analysis of the artifactual materials will continue for several months after the field season. Appropriate measurements and observations will be made on the ceramic, lithic, and other artifact classes. These will be classified for comparison with the assemblage within the Little Platte Valley and elsewhere. Tabulations of artifact type frequencies will be prepared. Drawings and photographs will be made for report illustrations. Drawings of floor plans and wall profiles will also be completed during this phase.

12. The various participating scientists (archaeologists, geologists, biologists, etc.), will discuss research findings and attempt to collectively synthesize the various kinds of data into a coherent picture of prehistoric human adaption in the upper Little Platte Valley.

The above outline of the methodology we propose to follow does not cover every detail but does, we believe, provide an adequate insight to our approaches and retains the necessary flexibility to allow us to adapt to unexpected discoveries and unusual circumstances. Before moving on to the organizational aspects of this project, it should be mentioned that while our methodology includes the physical search for buried Archaic and Woodland sites (by augering and trenching), it does

not include studying such sites as our research design would have us do. Mitigation of newly discovered sites will be considered separately from this Scope of Services. We anticipate being able to undertake the study of such newly discovered sites in the late spring and summer of 1979, if the Kansas City District desires mitigation.

CHRONICLE OF GAI'S SMITHVILLE LAKE PROGRAM

GAI'S proposal for the Smithville Lake Archaeological Mitigation Program was submitted to the Corps of Engineers, Kansas City, in early June 1978. On June 30, McHugh visited Kansas City to arrange for a visit to the project area for the purpose of locating the archaeological sites and ascertaining their condition. This visit was conducted with Patricia Moberly, Environmental Section, Kansas City District, Corps of Engineers, on July 1. A moderate amount of vegetation covered the sites examined (23 CL 208, 225 [now designated 273-276], and 226).

On July 7, 1978, the formal negotiations meeting between GAI Consultants and the Corps of Engineers took place, concluding successfully by mid-afternoon. Mr. James Niece, Group Director, GAI Consultants, and McHugh visited the project area and McHugh remained to locate an office and laboratory, find housing, and determine the availability of suitable field vehicles. GAI project personnel arrived in the Kansas City area over a period of several weeks. McHugh arrived on July 17; Marc Collier, Field Archaeologist on July 24; Jerry Lang, Field Archaeologist, on August 18 with a U-Haul truck filled with office and field equipment; Alan Paris, Field Archaeologist, on September 3. On August 19, George Gardner, project senior geologist and Dr. Jack Donahue, senior staff geomorphologist, arrived and began their regional reconnaissance.

The Corps of Engineers' contract was approved and signed on August 8, 1978, and was received by GAI Consultants on August 11. On the 16th, McHugh returned to two of the sites to be mitigated in order to stake and tag them to prevent any further damage to them from heavy machinery that was being used in the area. On August 18, two newly purchased vehicles were picked up. On August 21, the project geologists visited the Corps of Engineers office in order to determine the availability of topographic maps and aerial-photographs needed in our geological investigations. On this same date, an advertisement for field crew members was placed in the Smithville newspaper and several job positions were listed with the Missouri Job Service.

On August 24, the geologists and archaeologists visited the archaeological sites along the Little Platte River (sites 23 CL 208, 226, 273-276). The former two were easy to relocate but the latter complex was literally impossible to locate because of the dense, tall growth of weeds. This vegetation cover necessitated the discing of the floodplain and adjacent terrace simply to permit driving the field vehicles to the sites. A local farmer was hired to disc some 50-60 acres. Applicants for the field crew and other positions (secretary, laboratory assistant, photographer) were interviewed over the course of the next several days.

Formal archaeological investigations were initiated on August 28, with the beginning of work on 23 CL 208, by Jerry Lang, Marc Collier, and Dennis Falkenburg. Because the discing of the fields at Sites 23 CL 273-276 did not have the desired effect of making visible the prehistoric cultural remains reported for this locale, arrangements were made with a construction company working in the reservoir to employ a large motor-scraper (627B) and a roadgrader in removing the surface vegetation and upper plowzone from the presumed loci of these sites. This scraping and removal operation commenced on September 1, and all crew members were utilized to immediately examine the freshly prepared surfaces. The motor-scraper was again employed on September 5 and 6 and four major loci with cultural remains were discovered. Newly hired field crew members began work on September 5 and on September 8, work was resumed on 23 CL 208., with three new crew members under the supervision of Collier and Paris. In the meantime, Lang began to install a grid-system base line across the locale of sites 23 CL 273-276.

On September 8, McHugh located the sites along Camp Branch near Arley, 8 miles east of Smithville, and initial testing of 23 CL 232 began on September 13, under the supervision of Alan Paris. Lang and Collier began the excavations of the N440 locus (23 CL 275) on the floodplain. On the same date, Roberta Comstock and Van Shiplee of the Corps of Engineers visited the project and we later inspected a proposed barrow area near Plattsburg, Missouri.

Project consultant Dr. Dale Henning visited the project area on September 15, and suggested dividing the crew into two groups in order to work at two sites simultaneously. On September 17 and 18, heavy rains in the valley were impounded behind Smithville Dam, flooding the sites on the floodplain. Investigations were moved to the ridge in the northern end of the locale (sites 23 CL 274 and 276). McHugh left to join another project temporarily while Lang took over direction of field operations and Robert Houston assumed administrative duties.

Excavations continued at sites 23 CL 276 until September 28-29, when conditions permitted returning to the floodplain sites. Additional attempts were made to locate the cultural loci at 23 CL 232 on September 25 with a backhoe and on September 30, with the help of Brian O'Neill, the 1976 survey crew leader under Dr. Pat O'Brien.

Work continued at site 23 CL 273 early in October. On October 9, Marc Collier and three field crew members conducted a survey along the recently cleared banks of the Little Platte River in the vicinity of sites 23 CL 273-276 without finding any additional sites. When heavy rains again prevented work on the floodplain on October 11, excavations were begun at the second ridge-top site, 23 CL 274. On the next day, McHugh returned and resumed direction of the project. Excavations at 23 CL 274 and 276 continued until October 25 and October 27, respectively, and operations were then moved to site 23 CL 226, about one-half mile north. The excavations at this site continued until November 3. Our extensive testing at 23 CL 229, the second site near Arley, were begun on November 1 and continued until November 21.

Our surface reconnaissance of the area around sites 23 CL 229 and 232 led to the discovery of some abandoned stream channels and associated levees. The former were tested by Gardner and Dr. James King for paleobotanical remains and the associated levees were scraped clear of vegetation to explore for buried prehistoric sites. The reported locus of site 23 CL 232 was manually tested and also scraped with a tractor-mounted blade with very inconsequential results. The extensive manual and machine testing of site 23 CL 229 was terminated in favor of concentrated testing within the second-growth forest bordering the bluffs of the site. Here, in situ cultural remains were encountered in several test pits, but the lack of time and early winter weather conditions finally forced termination of operations shortly before Thanksgiving Day.

The final field operation of 1978 was the directed archaeological site survey, carried out in late November and early December 1978, under the direction of Marc Collier. Previously, Collier had monitored the deep-testing program conducted by George Gardner in the several locales where buried sites were thought to be located.

Processing of artifactural materials was begun during the earlier stages of the field work by the two, part-time lab assistants. On rain-days, the full crew was so employed. By early December, the project crew was reduced to three supervisors, two crew members, and one lab assistant/secretary. One supervisor left the project in mid-December and the second departed early in March, 1979.

The field investigations remaining to be completed in 1979 were restricted to features at 23 CL 274 and 276. These features were excavated in May, 1979, with a small crew consisting of two rehired field crew members and one supervisor (Marc Collier). One of the rehired crew members discovered an unreported site eroding out of a hillside near the eastern end of the dam, the victim of erosion caused by the temporary lake impoundments. Examination of this site by project consultants, Drs. Alfred Johnson and Dale Henning, led to the recommendation for its testing. This proposal was accepted by the Corps of Engineers and a week (August 27-31) was spent investigating this site (23 CL 279) with a crew of three.

Processing of samples taken for flotation recovery of archaeozoological and archaeobotanical remains was carried out in the laboratory during the early winter; these were submitted to specialists for identification during the winter and early spring. At the same time, artifact specimens were photographed by Mr. Jim Christensen, who also took the photographs documenting our field work and printed the bulk of the photographs utilized in this report.

Portions of the laboratory processing and analyses were carried out by several individuals: Marc Collier (lithic artifacts, distributional studies), Gerald Lang (ceramics, geographic background, mapping), Lee Rasmussen (flotation processing), Karen Summers (ceramics). Jill Schroeder, Secretary and General Assistant at Smithville, retyped the field notes and excavation unit forms, helped process artifacts, maintained the files, typed early versions of parts of this manuscript, paid

the bills, and kept the lab clean and functioning. The laboratory study of the artifactual remains was carried on throughout most of 1979, terminating in late November when preparations for closing the Smithville laboratory and office commenced. This was accomplished by mid-December 1979, leaving the final draft report to be completed at GAI Consultants main office during the period, January to June 1980.

ENDNOTES

1. See Response 7a in Appendix H-2 for clarification.

2. See Response 7b in Appendix H-2 for clarification.

CHAPTER II

THE ENVIRONMENT AND RECENT GEOGRAPHIC CHANGE IN THE LITTLE PLATTE VALLEY

INTRODUCTION

This chapter presents a general view of the environment of the Smithville Lake area and is also largely concerned with the impact of Euro-American activities on the landscape and drainage system. Information on these activities, based largely on historical sources and folk knowledge, helps to explain some of the landscape changes over the past 150 years and contributes to our understanding of the nature of some of the archaeological sites we have investigated. In addition, this section, by outlining the extent of geographic change in recent times, demonstrates the limitations that exist on using modern geographical conditions as an analog for prehistoric environments.

An outline of the geomorphic history of the valley, as developed by project geologists, George Gardner and Jack Donahue, comprises the next chapter, where the area's geology and soils are discussed. The formulation of a comprehensive model of paleogeographic conditions in the Smithville Lake area is beyond the scope of our investigations and the potential of the data we have recovered. Our geological-geomorphological and archaeological investigations, however, have produced some information pertinent to paleogeographic reconstruction. These data are reviewed in subsequent chapters where their paleogeographic implications are indicated.

THE LOCATION OF SMITHVILLE LAKE AND THE LITTLE PLATTE RIVER

Smithville Lake will occupy a 22-mile stretch of the Little Platte River between Smithville and Plattsburg, Missouri (Fig. 2-1) and will lie in parts of northwestern Clay County and southern Clinton County in northwestern Missouri. The lake will be formed by a reservoir created by the construction of an earthen dam two miles northeast of the town of Smithville, which is 20 miles north of Kansas City, Missouri. Because the Missouri River makes a turn from its southerly course along the Kansas-Missouri border to an easterly one, it lies both due south (19 mi.) and due west (16 mi.) of Smithville. The Little Platte River, which flows directly through Smithville and has frequently flooded the town, is a tributary of the Platte River, which empties into the Missouri River about 15 miles upstream from the mouth of the Kansas River.

Smithville Lake will comprise two major arms, the longer along the Little Platte and the shorter (ca. 10 mi.) along Camp Branch (creek), which drains into the Little Platte from the east. At the multi-purpose pool level of 864.5 feet MSL, Smithville Lake will innundate 7,190 acres, while the whole project area (multipurpose pool, flood pool, and controlled borderlands) will occupy 19,557 acres. The lake reservoir

lies mainly in Range 32 West, and Townships 53, 54, and 55 North. Located at 39° 23' N latitude and 94° 35' W longitude, Smithville, as well as the lake, are accessible by U. S. Highway 169 from St. Joseph (30 miles northwest), and North Kansas City (17 miles south), and by State Highway 92 from Platte City (on Interstate 29, 11 miles west), or from Kearney (on Interstate 35, 12 miles east).

DRAINAGE AND TOPOGRAPHY

Essentially, the Little Platte River and its tributaries drain a triangular area lying between the Platte, Grand, and Missouri Rivers (Fig. 3-1). The Little Platte joins the Platte River 5.75 miles west of Smithville, with the Platte emptying into the Missouri about 13 miles farther to the south-southwest. In draining such a restricted area of uplands, the Little Platte could hardly have ever served as a major regional or inter-regional waterway. The Grand, Platte, and Nodaway Rivers, whose headwaters are in southwest Iowa, and the Missouri River would have served as the main water arteries of the area.

The region drained by the Little Platte River is hilly, ranging from rolling upland areas to rugged, dissected stream borderlands. Access from the lowlands to the uplands is generally easy, although steep, rocky bluffs, 40 to 90 feet high in places, line some parts of the valley edge (e.g., west of Paradise). Overall, the region is topographically varied but within vertical relief limits of less than 200 feet.

The Smithville area itself is the focus of local drainage; including Camp Branch, five perennial, and numerous seasonal streams discharge into the Little Platte River near the town. The choice of this place for a grist mill by Humphrey Smith in 1822 must have been influenced by the steady supply of water from these streams as well as the nearby falls. Immediately east of Smithville is, by local standards, the most extensive area of bottomlands (surface below ca. 830 feet M.S.L.), across which the Little Platte River flows south and then abruptly northwest as it enters the town and is there joined by Wilkenson Creek. The floodplain contracts upstream but expands again where the next two tributaries (Crows Creek and Camp Branch) join the Little Platte. The width of the floodplain narrows again at State Route W, about five miles upstream from Smithville, but increases again to the north, west of Paradise and south of the very narrow gap between the steep limestone bluffs at the site of Ross's Mill. This gap guides the Little Platte River across a very narrow (0.1-0.3-mile wide) floodplain for about 1.5 miles (2.4 km) until the Trimble basin is reached, where the floodplain, now diked to form lagoons, expands to a mile or so in width.

The stretch from the Ross's Mill gap to the town of Smithville has a relatively wide floodplain flanked by gentle, rounded hills and a low river gradient (1.65 feet/mile, or 0.0003 gradient). Three perennial and several intermittent streams join the Little Platte in this stretch, while several remnants of ancient stream channels suggest main channel migration and the existence of water-filled sloughs (abandoned meanders) in the past. This area presents a conjunction of macro-environmental

situations (e.g., riverine, lacustrine, floodplain, hill slopes, and uplands) which undoubtedly have many variations on the micro-environmental level depending on such factors as micro-relief, drainage, soil types, vegetation, exposure and insolation, among others.

This description has narrowed its focus from the general geographic area under consideration to the limited stretch of the Little Platte valley receiving the most concentrated archaeological attention. While the description of the basic drainage pattern and general topography has probably not changed appreciably in the past several thousand years, we cannot assume that present conditions on the meso- and micro-environmental levels have prevailed during these last millennia. Evidence will be presented later in this chapter of changes in the landscape which have taken place in the past century and a half, some of which can be graphically documented, while others are part of local folk knowledge. These changes have had an impact on the prehistoric archaeological record and are therefore pertinent.

CLIMATE, DROUGHTS, AND FLOODS

Since Smithville and the Little Platte valley are without direct instrumental weather records, data from several stations in the surrounding area will be employed to characterize the climate of the Smithville Lake locale. The overall climate in Missouri, an inland state with a continental climate, is characterized by frequent weather changes from day to day and season to season. Cold, dry air from Canada, dry air from the West, and warm, moist air from the Gulf of Mexico converge on Missouri and contribute significantly to its climate (McQuigg 1969).

Because of its latitude, Missouri experiences a temperate climate and a progression of seasons, with the highest temperatures occurring in July and August, and the lowest temperatures in January. The average annual temperature for the state (through 1930) is 45° F; in January, the temperature averages 26°, and in July, 77° (Reeder 1932). From June through July, temperatures occasionally rise to 95° F, but seldom exceed 100°. Temperatures exceed 90° F an average of 20 days a year.

Statewide, precipitation ranges from 32 inches in far northwest Missouri to 50 inches a year in the southeast. December and January receive the least precipitation and May the greatest amount. Apart from the three winter months, precipitation is rather evenly distributed throughout the other three seasons, with the summer receiving somewhat more than spring or autumn. In Clinton and Clay Counties, the average annual precipitation is 35 to 37 inches, which is distributed as follows: winter, 4 inches; spring, 10-11 inches; summer, 12 inches; autumn, 9-10 inches.

While most of the annual snowfall occurs in December, January, and February, snow has been known to fall as early as September and as late as May. North of the Missouri River, average annual snowfall ranges from 18 inches to 20 inches, but much greater amounts have been recorded; for instance, the town of Oregon, Holt County, in northwest

Missouri, received a record 74 inches in 1888-1889 (Reeder 1932). The average winter has 105 days with temperatures below 32° F. The frost-free season for the northwest quarter of the state averages about 173 days, extending from about April 21 to October 11.

Annual and Seasonal Temperature Variation

Predictably, temperatures in northwest Missouri are lowest in January and highest in July. Figure 2-2 depicts the average monthly mean temperatures for four stations (St. Joseph, Maryville, Kansas City, and Lexington) located northwest, north, south, and southeast of Smithville. A consistent pattern emerges when mean values are compared, suggesting the validity of extrapolating a range of temperature variation for the Smithville area from these data. A small latitudinal factor can be detected in the Figure 2-2 values, as the two southern stations (Kansas City and Lexington) have slightly higher means than do the two northern stations. Differences in elevation may also figure in the temperature variation among the four stations. Mean monthly temperatures for the Smithville area range from slightly below 30° F in January to slightly above 80° F in July, a range of over 50°. Of course, extreme temperatures exceed these mean values considerably, with January normally having a few days during which the temperatures plunge below zero, sometimes to 20° or more below zero. Temperatures in July and August may rise above 100° F and may occasionally approach 110° F, although highs in the 90's are more usual.

The magnitude of monthly temperature variation can be seen in Figure 2-3 in which the differences in monthly maximum, average, and minimum mean temperatures for the period 1910-1930 at St. Joseph, Missouri, are plotted. By way of explanation, three sets of values are depicted for each month of the year. For example, the upper vertical bar for August shows the range between the highest and lowest values of the mean maximum temperature for the month. In other words, during the warmest August on record, the average of the highest temperatures for the 31-day period, is 98° F, the uppermost value on the upper bar. In the coolest August, the average of the highest temperatures is only 80° F, the lowermost value on the upper bar. The highest average temperature for August is 84° F, and the lowest is 71° F. In Figure 2.2, a value of 77° F for the August mean temperature is indicated. The highest average night-time low temperature for August is 71° F, and the lowest average night-time low is 62° F.

The data in Table 2-1 have been extracted from Figure 2.3 and show the range of variation for the mean maximum and mean minimum monthly temperatures. Overall, March is the month of greatest temperature variation, mainly because of the great variation in mean maximum temperature. The winter months exhibit much more variability than the summer months and slightly more than the spring months. The summer months reveal the least variation, with June having the least of all months.

The figures of Table 2-1 and Figure 2-3 support the characterization of Missouri's climate as continental and marked by frequent changes on daily and seasonal bases. By extension, it is reasonable to employ

the patterns of temperature variation seen in the records from St. Joseph, only 27 miles to the northwest, and Kansas City, 20 miles to the south, for Smithville.

In spite of the temperature variation apparent in Figure 2-3 and Table 2-1, the mean annual temperature at St. Joseph varies only between 51.3° and 57.2° F, averaging 53.9° F (Reeder 1932). This value shows the effect of merging the monthly and seasonal temperature variations in an annual mean figure, i.e., it obscures the amount of variation that actually exists and is experienced by the plant and animal communities of the area, to whom these means are probably irrelevant.

Annual and Seasonal Variation in Precipitation

Climatic variability in northwest Missouri is probably more pronounced in the amount of precipitation received on a month-to-month and year-to-year basis than in temperature. Most of the moisture which falls in Missouri is derived from warm, moist air masses from the Gulf of Mexico, and are released through the mechanisms of frontal activity or, especially in the summer, thunderstorms. Variability in mean monthly precipitation at Kansas City and St. Joseph for three 10-year periods (1921-30, 1931-40, 1941-50) is presented in Table 2-2. The variation in monthly precipitation at each station is readily apparent; the winter months receive the lowest amounts, May and June the greatest, with August and September receiving somewhat less than May and June and July exhibiting a decrease in summer precipitation. This pattern is consistent for both Kansas City and St. Joseph.

Nevertheless, for each month, a fair amount of variability in the precipitation amounts for the two stations exists; the greatest part of the annual difference between them is due to differences in precipitation received in May and June, the months receiving the most rain. The average annual precipitation for each station is remarkably close: 37.22 and 36.45 inches for the years 1921-30; 30.69 and 30.88 inches for 1931-40; and 37.88 and 37.50 for 1941-50. But again, these mean figures obscure the differences between the monthly and seasonal precipitation. The sums of the absolute differences between the monthly means are 4.65 inches, 5.99 inches, and 5.38 inches, respectively, for the three decades. What we see here is the usual Plains-Midwestern disparity in the distribution of snow and rain, especially the latter during the late spring, summer, and early fall, the time of most thundershowers.

The relatively low annual precipitation values for the years 1931-40 are graphically displayed in Figure 2-4 and contrast markedly with the higher values of the preceding and the following years. The general synchroneity in trends between Kansas City and St. Joseph is apparent, but so also is the lack of complete correspondence; in 11 of the 30 years, the trends at the two stations are opposite (i.e., precipitation increases at one station and simultaneously decreases at the other). Again, we have the classic situation where the precipitation pattern is dominated by localized thundershowers wherein nearby stations can receive markedly different quantities of rain and be "out-of-phase" with each other.

A longer-term precipitation record for St. Joseph is presented in Table 2-3. The lowest annual precipitation for St. Joseph was recorded in 1901 at 20.53 inches and the highest in 1877 at 57.13 inches (Reeder 1932). Table 2-3 shows five-year grouped annual averages varying from 41.53 inches (1876-80) to a low of 30.49 inches (1936-40). The 1940's turn out to be the wettest decade (37.52 inches annually), and the 1930's, a notoriously arid decade, the driest (32.00 inches annually). The standard deviation values indicate an estimated variation in precipitation amounts compared to the mean values. For instance, for the period 1941-50, annual precipitation fell short of or exceeded the mean by 5.5 or more inches in one out of three years. The average annual precipitation at St. Joseph for 75 years (1876-1950) is 34.04 inches, with a standard deviation of 7.66 inches, which equals 22.5 percent of the mean value. In other words, annual precipitation at St. Joseph fell short of or exceeded the mean by 7.66 inches or more in one-third of the years on record. The situation at Kansas City is comparable. There, the mean annual precipitation for the period up to 1969 is 34.07 inches, with the highest amount of 58.77 inches falling in 1949 and the lowest of 21.51 inches in 1936 (Decker 1955; see Figure 2-4).

It seems reasonable, in view of the proximity of Kansas City and St. Joseph, to propose that the Smithville area experienced conditions similiar to those reported for these two stations, while recognizing the differences in timing and magnitude of the variations in temperature and precipitation for these two cities. Given the variability we have noted in temperatures and precipitation, it is not unexpected that periodic droughts and floods have been experienced in the area. Droughts affected the Smithville area in 1901, 1906, 1930, 1934, 1936, 1954, and 1956 (Smithville Historical Society 1967: 8; Shockley 1977: 68, 73, 74). Severe droughts in Missouri are also recorded for 1911, 1913, 1914, 1916, 1918 (Reeder 1932), and Decker (1958) reports the following notable dry periods in western Missouri:

Tarkio, Atchinson Co., NW Missouri: 1939; Aug. 18-Sept. 28, 42 days;

Bethany, Harrison Co., NW Missouri: 1935; June 7-July 19, 43 days;

Kansas City, west central Missouri: 1945; July 14-Sept. 6, 55 days;

Springfield, Greene Co., SW Missouri: 1953; June 2-Aug. 3, 63 days.

The 1930's saw more record-breaking dry periods than any other decade since instrumental recording was begun (ibid.). It is curious that the droughts of 1911-1918 are not reported for Smithville, but in many of these years, much less than the mean annual precipitation is recorded for St. Joseph (Reeder 1932). An even earlier, five-year dry period, 1884-89, with a mean annual precipitation of 25.07 inches (± 2.86), is reported for St. Joseph, but droughts during this dry period are not reported in the Smithville histories. The drought in Smithville in 1956 was so severe that no water flowed in the Little Platte River for a time, and water had to be transported daily from the Mid Continent Airport in Kansas City (Smithville Historical Society 1967: 9).

Many floods have occurred on the Little Platte River, some with devastating impact on Smithville. The floods of 1844 (when there was a great flood on the Missouri River), 1885 (the greatest since 1844), 1903 (highest since 1844), 1915 (highest in 50 years), 1929 (washed out the iron wagon bridge), and 1965 (most damaging ever) were certainly outstanding ones. (Smithville Historical Society 1967). Floodwaters rose to twelve feet in downtown Smithville during the flood of 1965, the same year that Congress authorized construction of the Smithville Dam. Shockley (1977: 79-80) reports that 39 floods occurred in the entire Platte River drainage basin since 1930, but how many involved the Little Platte River is unknown.

Lack of instrumental weather records for the Little Platte River drainage make it impossible to correlate the frequency of flooding and droughts with temperature and rainfall variations. It is possible, however, that flooding on the Little Platte is a local phenomena resulting from moisture in the drainage area in excess of that which can be absorbed by the existing vegetation, soils, and subsurface aquifers. Since the vegetation cover and floodplain morphology in the Little Platte drainage area have been considerably altered during the century and a half of Euro-American settlement, the flood regime of recent decades is probably not similar to those which prevailed in prehistoric or proto-historic times (i.e., before 1820). The complaints about the greater frequency and severity of flooding in recent decades, therefore, may have a basis in historical fact.

On the other hand, while droughts reflect local deficiencies in precipitation (dry spells in which moisture requirements of the growing vegetation are not met), weather variations on a regional scale seem to be more responsible for droughts than for flooding. Drought conditions are generally widespread; large areas in the state, or even parts of several contiguous states, are involved. The effect of Euro-American settlement and activities on the frequency, severity, duration, and timing of droughts is probably negligible. The impact of extended dry periods, however, has undoubtedly been great on Euro-American agriculturalists; the records and recollections of droughts are evidence of that fact.

<u>Climatic Characterization</u>

On the basis of instrumental records covering only a century or less in northwestern Missouri, we offer the following characterization of the climate and weather of the area: marked seasonality (i.e., well-differentiated temperature and precipitation regimes by season), and relatively high variability in temperatures and precipitation from year to year and between the same seasons and months in successive years. More specifically, the four seasons may be described as follows:

1. Winter (December-January-February): cold, relatively dry:

   a. mean temperatures range between 25° F and 33° F; subzero temperatures on a few days, sometimes approaching -20° F;

   b. three to five inches of precipitation, mainly in the form of snow, which generally does not remain on the ground

throughout the winter because of thawing temperatures and occasional rain.

2. Spring (March-April-May): period of great variation as temperatures increase and precipitation more than doubles over previous season:

    a. mean temperatures range from 44° F to 64° F, with the coldest days in March approaching 10° F; the average latest day with below freezing temperatures is about April 21;

    b. 8.7 to 11.5 inches of precipitation, mainly rain, with May the wettest month of spring;

    c. floods possible in late spring.

3. Summer (June-July-August): warm to hot, generally humid:

    a. mean temperatures range from 73° F to 78° F, with the hottest days approaching or exceeding 100° F;

    b. precipitation varies from 9 to 14.5 inches with June receiving the most; since the source of the rain is mainly thundershowers, wide variability in amounts and surface distribution is axiomatic, and short, heavy downpours are more common than sustained, gentle rains;

    c. hot, dry spells are fairly common and become droughts when they adversely affect crop growth and development;

    d. tornados occasionally occur in association with heavy thunderstorms.

4. Autumn (September-October-November): progressively decreasing temperatures and generally diminishing rainfall;

    a. mean temperatures drop from 68° F to 43° F, and the first killing frost occurs about the second week in October;

    b. precipitation ranges from about 7.2 inches to 10.3 inches with September the wettest; snow possible in October, probable in November.

Recent variation in temperatures and precipitation is apparently not cyclical or part of a trend toward a colder or warmer, or a drier or wetter climate. There have been, in the instrumentally recorded past, short periods of two or more years during which, for instance, precipitation has been much lower than before or afterwards. One of these periods was in the 1930's, especially the middle part of the decade, when drought conditions produced the infamous Dust Bowl in the south-central United States. The debate over the significance of historically recorded climatological variables need not be raised here. We conclude this purely descriptive section by reiterating that weather conditions for the Kansas City area reveal considerable variability from year to

year and for the same season or month within successive years. It is not presumptuous to suggest that climatic variability of similar magnitude characterized the area during prehistoric times when earlier groups were occupying the area.

EURO-AMERICAN IMPACT ON THE LITTLE PLATTE VALLEY

Rationale for Inclusion

During the year we spent in the Smithville area conducting our archaeological field investigations, the affects of recent human activities on the landscape became increasingly evident. In addition, we thought that some of the problems we had in locating prehistoric archaeological sites and understanding their internal composition might well have been due to changes or conditions brought about by events and processes of the past 150 years when the first Euro-Americans settled the area. This point was driven home when, during the course of field work in the fall of 1978, several local residents told us how much the valley had filled-in during the past half-century. This was the very area where two or three floodplain sites had caused us some bewilderment because of their impoverished contents and formless nature. The need for some understanding of recent depositional and erosional processes on the floodplain and the human activities related to these processes became gradually apparent to us.

This section will not be an exhaustive treatment of the topic, but rather, will attempt to relate the pertinent information gleaned from a few publications or provided by local citizens, and supplemented by our own observations. A generally consistent picture has emerged in comparing these different kinds of data. This picture will be developed in this section, but its implications for the archaeological sites we investigated will be postponed until Chapter IV.

Folk Knowledge

As mentioned above, we began receiving information on the recent physical developments in the Little Platte valley during the course of field work when visitors to our excavations and laboratory shared their opinions of what had happened. Mr. Harold Harris, former owner and occupant of a farm along the Little Platte, said that he had seen evidence of floodplain-building during the seven years (1966-1973) that he had farmed there. He remembered a corner fence post which he had installed that had become nearly buried by alluvium in a few short years. Harris, along with others, commented on the greater frequency of flooding in recent years, and there was general belief that the magnitude of the flooding had become greater as well. Of course, the all-time record flood, at least as far as living residents are concerned, had occurred as recently as 1965 when downtown Smithville was under twelve feet or more of water (Smithville Historical Society 1967: Photograph, p. 47). But this was just the worst of a long series of floods which had plagued Smithville and the residents of the Little Platte valley.

Returning to the less dramatic effects of flooding, we were informed by a number of individuals that the amount of recent sedimentation on the floodplain was indeed considerable. Buster Summers estimated it to be on the order of 20 feet. We heard from him and others the story about how it had once been possible to tow a hay-rack full of hay under the eastern end of the Miller Bridge; one informant added that a boy could even stand atop the hay while passing underneath. The Miller Bridge was erected about 1906. A photograph of August 10, 1979 (Plate 2-3b) shows that it would now be impossible for a horse-drawn wagon piled high with hay to pass under the bridge. The immediate deduction is that considerable alluvial sediments have been deposited around the foundation of the bridge.

Reuben Ross, the 84-year-old grandson of William Ross, who built the first mill in 1840 at the place since known as Ross's Mill, was born and raised in the vicinity. He remembers playing as a boy on the wooden sill, made of foot-thick oak logs, which were set in the rock ledge across the river at the site of the mill. A rocky ford about one-eighth mile below the dam was used to cross the river until the first metal-frame bridge was built in 1886; the same bridge is now (1979) being used at this place. It was overhauled, according to Reuben Ross, in 1916, at the same time the Miller Bridge was also overhauled.

Mr. Ross remembers when the eastern end of the Miller Bridge stood high enough off the ground that a hay-rack could be drawn under it. He says that the roadbed approaches at each end of the bridge had been built up with fill from the surrounding floodplain or the hills nearby. According to Mr. Ross, no earlier bridge preceded the present metal Miller Bridge at that site.

As far as Reuben Ross is concerned, the single most important factor in explaining the present, silted-in nature of the Little Platte valley is the widespread cutting of the forests to expand cultivation, which promoted soil loss from the hills and uplands and its subsequent deposition in the low areas along the river. As noted by others, Ross also reports that the Little Platte was a wider river and occupied a wider trough in the days of his youth than it does now. A bank-to-bank stream was high water in those days, according to Reuben, who is also convinced of the greater magnitude of the floods in recent decades.

On the very day that typing of this section was begun, Messrs. Frank and Charlie Miller, former owners and occupants of property immediately north of the Miller Bridge, dropped into the lab with artifacts acquired over a period of 75 years. Frank Miller is 85 years old, Charley 81, and they had farmed the area east and west of the Little Platte near the Miller Bridge for over 60 years. Frank, who repeated the oft-told story of the hay-rack and the Miller Bridge, remembered the construction of the bridge, how the timber pilings were driven into the ground by a trip-hammer, and how a horse drew the hammer up to the top. Without any equivocation, he said that the bottom of the bridge floor was erected 18 feet above the river bank. Both Frank and Charlie recall the presence at this place in the river of large limestone slabs, a riffle around which they used to play, and the sandy bottom of the clear-flowing river. Both gentlemen also recall a bridge crossing the Little Platte between the mouths of Camp Branch and Crows Creek (about

0.75 mile south of the Miller Bridge). Frank said that he could show us the road leading from this bridge. Frank believed that this older bridge must have been erected at what was known as Swan's Ford, a popular crossing, located about four miles upstream from Smithville. Neither the rock slabs which formed the riffle nor the rocky bottom of the ford are visible at present. We will return to these features later in this discussion, when literary sources are utilized.

In conversation, the Miller brothers referred to the first and second bottoms which they said were once clearly differentiated, the first bottom being the lower of the two. The two brothers agreed that it was not possible at present to distinguish two different levels on the floodplain because, as they said, the lower one had filled in. Frank Miller blamed this filling on the construction of the Highway 169 Bridge, just west of downtown Smithville, in 1937, which he believed held up the discharge of flood waters on the Little Platte, causing it to back-up and to deposit its load in the lower parts of the floodplain above Smithville. Before evaluating this possibility, we want to report some other changes imposed on the landscape by its farmer-residents.

We have noted the great frequency of farm ponds in the region, many of which result from the Soil Conservation Service Programs to check erosion and retain water where it is needed. In addition, local farmers themselves had dams built and ponds or little lakes formed. Frank Miller had one constructed on his farm just north of the Miller Bridge in 1953 and had aided a friend in constructing a series of ponds called Shady Hollow Lakes 1.5 miles north of the Miller Bridge, on the east side of the valley. The soil erosion check-dam program is largely a product of the past three decades and should have reduced soil loss and accumulation in the Little Platte basin in recent decades. According to local observers, however, the deposition of alluvium has neither stopped nor been diminished in recent years, and that the process has progressed unabated for several generations, at least since the turn of the century if not before. The concrete and inferential evidence for this thesis will be reviewed below.

Documentary Evidence

A useful place to begin this section is with a brief review of the founding of Smith's Mill and a description of its location. While physical evidence for the dam which impounded water to drive the mill is no longer visible, remnants of the dam apparently still existed in the 1960's (per. comm., Marge Harris). According to R. L. Patterson (1947: 3/28), son of W. H. Patterson, who once owned the mill originally built by Humphrey Smith, the site consisted of a series of rock ledges that spanned the river and formed three waterfalls and a series of basins. The total fall was about 10.5 feet. Here, in 1826, Humphrey Smith built a dam above the brink of the falls (Patterson 1947), a sill of hewn walnut logs resting in a groove of solid rock. This dam was washed out several times and rebuilt for the third and last time in 1905. A picture of the dam, circa 1900, is shown in Plate 2-1a. A picture of the dam's remains in the early 1960's (it was torn out after the 1965 flood) appears in Plate 2-1b.

According to Patterson (1947: 3/28), in the late 1880's to 1890's, the dam backed water upstream for about six miles. "At low stage Swan's Ford was the end of the backwater, but when the dam was full and pouring over the backwater extended to the Aker Riffle, about two miles further upstream. . . . This stretch of river was 80 to 90 feet wide. . . . In depth it ranged from 20 to 25 feet as far upstream as the Breckenridge Island. Here at this island in the early days before the dam was built, there must have been a falls." Here then is documentation of the Little Platte's impoundment and the backing of its waters for about six miles upstream of Smithville, a distance easily encompassing the stretch of river extending about a mile north of the Miller Bridge. Breckenridge Island no longer exists, the Aker Riffle is under mud, and Swan's Ford is no longer discernable. Patterson also reported the existence of dams at Ross's Mill and above Mecca at Hickson's Mills.

The Smith's Mill dam was not the only barrier to stream flow in the town. For generations, the Little Platte has been spanned by a bridge located continuously at its present position on Bridge Street. The present steel and concrete bridge, erected in 1936, was preceded by a metal wagon bridge (Plate 2-2a) which had been constructed in 1876 and destroyed by a flood in 1929. Previously, two wooden bridges (Taylor and Harris 1966: 42) had existed in the same place. Although these bridges must have spanned the Little Platte over the impoundment created by the dam at Smith's Mill (and its successors), no mention can be found of this relationship. Another bridge, the railroad bridge pictured in Plate 2-2b, spanned the Little Platte just a few blocks east of Bridge Street. This photograph clearly reveals heavy vegetation backed up by the bridge supports and approaches. The first railroad tracks through Smithville were completed in 1887 (Smithville Historical Society: 5), and we presume the railroad bridge was completed at this date and used until August, 1939, when rail service was discontinued and the bridge dismantled (Taylor and Harris 1966: 59-61). In July, 1924, flood waters were reported to be within four feet of the trestle of the railroad bridge (ibid.), approximately the situation pictured in Plate 2-2b.

Three other bridges are known to have been constructed over the Little Platte River upstream from Smithville. The closest one, located at or near Swan's Ford, about three miles above Smithville, was put up in the late 1880's and removed in the late 1940's (per. comm.: Reuben Ross, Raymond Porter, Harold Harris). The dirt track once leading to the southern end of the bridge is still visible on recent aerial photographs. A second bridge was constructed below Ross's Mill, about seven miles upstream from Smithville, in 1886, about the same time the Swan's Ford bridge was built. It is a metal frame bridge with a wooden deck, and it still (1979) carries vehicular traffic. As previously mentioned, the Miller Bridge on State Route W, five miles above Smithville (Plate 2-3), is a metal frame bridge built about 1906 and is virtually identical to the Ross's Mill bridge. Still in use at the time of this writing, it will figure further in our discussion on the impact of Euro-American activities on the archaeological sites in Chapter IV.

We have shown that, over the past 150 years, a number of artificial barriers, mill dams, and vehicular bridges have been constructed in the central part of the Little Platte valley. Beginning in 1826 with the construction of the original dam by Humphrey Smith, the Little Platte

River and its surrounding landscape have been increasingly affected by Euro-American settlers in the area. Much of this impact is related to agricultural activities and the clearance of forest cover within the drainage. A little factual information will demonstrate the obvious.

First, the mill was built to grind grain from the local vicinity; "Yankee" Smith was, first and foremost, a businessman, and clearly a successful one. The mill thrived and became the center of an important commercial center, as more and more settlers were attracted to the area. In 1826, 93 emigrants from Bourbon County, Kentucky, settled in northwest Clay County, 10 miles or less from Smithville, and brought with them 150 sheep, 75 cattle, and a large number of horses. A year later, a military post was established at Fort Leavenworth, and Clay County became the main supplier of the foodstuffs needed by the personnel at the fort (Shockley 1977: 49-50). By 1858, hemp was a major crop in the region, and a factory to process it had been established in Liberty (ibid.: 57). By 1870, it is reported that vast quantities of walnut timber were being cut and removed from the region (Smithville Historical Society 1967: 4).

One local saying, oft-repeated after the major flood of May, 1915, fairly well sums up the main point being made here; according to the residents of low-lying Smithville, "The fellows who live on the hills are the losers. Think of the hundreds of acres of good rich land carried downstream to enrich the lowlands" (Smithville Historical Society 1967: 6; from the Smithville Democrat-Herald, according to Marge Harris, per. comm.). It would seem that the effects of cultivation in promoting soil loss from the hills and uplands, and the accumulation of these soils in the low areas adjacent to the river were already widely recognized by the local citizenry over 60 years ago. This point supports the argument that significant alteration of the landscape in the middle Little Platte valley has occurred. Specifically, the argument states that substantial amounts of soil have eroded off the higher ground and been deposited in the low-lying areas which were periodically flooded. These interrelated processes, which have been accelerated by such human activity as farming, lumbering, and construction, have also affected the native vegetation, which will be treated in the next section.

RECENT CHANGES IN VEGETATION PATTERNS

Studies of existing vegetation in the middle Little Platte valley have not been conducted as part of any of the archaeological investigations carried out there. Calabrese (1969: 20-21) generalized on the area vegetation by employing John Mori's (1967: 4-8) scheme. In a similar fashion, O'Brien (1977: 2) has employed the classification of Baumler (Brown and Baumler 1976: 11-43) for the pre-Euro-American environment of the Little Blue River valley. These two schemes recognize three different vegetation zones which do not precisely correspond.

Mori's Classification	Baumler's Classification
1. Upland (tall grass) prairie	1. Upland prairie
2. Upland borders and bottomlands of small tributaries composite hardwood forests, especially oak and hickory.	2. Upland and slope forests.
3. Missouri River bottomlands water-demanding/tolerant trees.	3. Tributary floodplain forest

O'Brien (ibid.) notes the hill slope-upland forests had the greatest diversity of food-producing arboreal and herbaceous species, and the upland prairie the least. Calabrese does not rate the three zones for their potential in producing plant foods for human consumption.

For the general area, Alfred E. Johnson's investigations in Brush Creek valley, southern Platte County, are the first systematic attempt to characterize the existing vegetation communities (Johnson 1974). Brush Creek, whose headwaters are about nine miles (14.5 km) southwest of Smithville, was formerly a tributary of the Platte River (as is the Little Platte), joining it on the Missouri floodplain. Johnson (ibid.: 109-114) employed the earliest historical records made of the vegetation in the area, the 1840 land plates and surveyors' notes and an 1842 map depicting the forests and prairies in the Platte Purchase and adjacent areas. The data from these sources were compared with that from the vegetation sampling transects of Brush Creek made by Eileen Johnson.

The modern sample showed that 75 percent of the arboreal species recorded in the 1840 data were still present in Brush Creek. Notably missing in the recent survey are White Oak (<u>Quercus alba</u> L.), Bitternut Hickory (<u>Carya cordi formis</u> Wang), Hazelnut (<u>Corylus americana</u> Walt), and Buckeye (<u>Aesculus glabra</u> willd.), four edible nut or acorn producing varieties. Seven species, not recorded in the 1840 survey, were noted in the recent survey: Sugar Maple (<u>Acer saccharinum</u> L.), American Bladder Nut (<u>Staphylea trifolia</u> L.), Eastern Redbud (<u>Cercis canadensis</u> L.), Summer Haw (<u>Crataegus mollis</u> T. & G.), Hawthorn (<u>Crataegus</u> supp. L.), and Black Locust (<u>Robinia pseudoacacia</u> L.). Johnson (ibid.: 111) believes that the discrepancies between the two lists probably result from sampling biases and are not indicative of significant change in the arboreal vegetation of the area between 1840 and 1971. Presumably, this statement must be taken qualitatively and not quantitatively given the great amount of forest clearance due to the expansion of the agriculture.

From the two lists of arboreal species and the 1971 list of herbaceous plants, Johnson identifies four "micro-environmental zones" for the early historic period, prior to extensive changes caused by Euro-American activities. These zones are (ibid.: 114):

1. a prairie zone on the interfluves, some eight miles from the Missouri;

2. an oak-hickory forest along the bluff line and in the breaks;

3. a riverbottom forest on the Missouri floodplain (high frequencies of elm, sycamore, ash, and box elder); and

4. the Missouri River itself with its extensive aquatic fauna.

The first three zones are based on terrestrial vegetation and correspond to Mori's (1967) classification which fails to identify tributary stream bottomlands as a distinctive "micro-environmental zone." Johnson does note that additional "micro-environmental zones" can probably be identified for the lower Missouri River valley on the model developed for the low Illinois River valley by Zawacki and Hausfater (1969; cited by Johnson, ibid.).

An indication of the vegetative complexity and potential of the Missouri River floodplain is illustrated and discussed by Munger et al. (1974: 916-933). Using a dynamic model of vegetation change through time, they identify four stages of floodplain vegetation development:

1. 0-10 years: willow association on open soil, sandbar willow dominant;

2. 10-30 years: young floodplain forest featuring black willow followed by cottonwood;

3. 30-100 years: mature floodplain forest dominated by older cottonwoods and abundant understory of shade-tolerant trees including silver maple, mulberry, hackberry, and elm; and

4. more than 100 years: mature hardwood forest with American elm, hackberry, ash, mulberry, and box elder in areas protected from flooding (i.e., on terraces above normal flood levels).

This study determined that individual trees in the mature hardwood forest were greater than 150 years old at one site and greater than 250 years old at another (ibid.: 928). The Missouri River floodplain retains only small areas of mature forest at present, ranging generally between zero to 13 percent of the floodplain area between Rulo and St. Louis (ibid.: 926-7, Figure 12-5) and averaging about 6 percent. Cultivated areas range between 58 percent and 90 percent of the floodplain area. Thus, the amount of land removed from the natural succession, and mostly from the young and mature forest stages, can be easily appreciated.

With this multi-fold model of Missouri River environmental zones in mind, and given the diversity of arboreal (and herbaceous) species in the Brush Creek valley, one might assume that the tributary valleys of the Missouri River were more complex than the three-division vegetation-physiographic models suggest. Even if the floodplain along the tributaries is much smaller than that of the Missouri River, different elevational situations and drainage conditions probably allowed the maintenance of the four arboreal zones recorded for the Missouri floodplain. For instance, the first and second bottoms along the Little Platte are likely to have supported different arboreal complexes because of the greater frequency of flooding on the first (lower) bottom.

It is likely that the native arboreal vegetation of the floodplain along the Little Platte River was the first to be eliminated in Euro-American times when plow cultivation was introduced and intensified. The oldest trees that we observed along the present channel are less than 100 years old (>70 <100 years), based on tree-ring counts on two selected specimens (and hardly an adequate sample). Nevertheless, trees older than 150 years are nonexistent in the floodplain.

A similar situation characterizes the uplands where acres and acres of hardwood forest have been cut during the lives of our older informants. Reuben Ross recalls the cutting of 40 acres of white oak between 1905 and 1910, trees eight to ten feet around, while Raymond Porter also remembers another 40 acres being cut. The logs were sometimes burned when there was no commercial market for them, but there was a steady commercial demand for such woods as walnut on a continuing basis, and other types periodically. Of course, oak and other species were used locally for homes and other buildings, dams, bridges, fences, furniture, etc. Both Smith's Mill and Ross's Mill had the capability of turning logs into lumber (Smithville Historical Society 1967: 4; Taylor and Harris 1966: 3; Patterson 1947). A local lumber industry which existed in the later 1800's depleted native hardwood forests, with large quantities of walnut timber being removed from the area in 1870 (Smithville Historical Society 1967: 4). This reference may be to the 500 to 600 walnut and wild cherry trees cut between Smithville and Ross's Mill by W. H. Patterson and transported down the frozen river to the saw mill below the dam (Patterson 1947).

It is clear that the natural arboreal vegetation of the Little Platte valley has been drastically reduced in areal extent and even eliminated in certain zones (e.g., the cultivated bottoms, the upland croplands, and pastures). Existing vegetation serves as a pale reminder of that of the early nineteenth century, before Euro-American agricultural and commercial practices were introduced. Fifteen decades of Euro-American activities in the area have probably had a more pronounced impact on the environment than any similar period in the past.

SUMMARY AND CONCLUSIONS

Smithville Lake in northwest Missouri is located in a zone of temperate climate and marked seasonality with cold, relatively dry winters and hot, relatively humid summers. Missouri's weather is characterized by variability, as the expression, "If you don't like the weather, just wait a few hours, and it will change," indicates. A review of climatological records covering a century, at most, demonstrates the variability in temperature and precipitation for reporting stations around Smithville. We can safely assume that the Smithville Lake area experiences conditions similar to these stations, and especially the variability characteristic of the area's climate.

Two centuries ago, the Smithville area would have been heavily forested in the riverbottoms, on the hill slopes, and on the uplands, although tall-grass prairie occupied sizeable areas on the interfluves. Timbered areas are now restricted to farm plots, minor tributary

valleys, and the banks of the Little Platte River. Recently, before government acquisition, croplands accounted for most of the bottomlands, large parts of the uplands, and even the slopes. Pastures also account for part of the uplands and slopes.

The native forests have been removed to expand croplands for the most part, although the production of building materials (lumber, furniture wood, bridge timbers, etc.) and fuel (home and commercial use, brick making) have also been factors. Removal of the forests and farming of the uplands and hill slopes have led to the loss of topsoil, which has washed into the valley bottoms where it has been deposited in great quantities.

Undoubtedly, variability in weather conditions has figured in this process. Dry, hot spells causing plant desiccation have allowed aeolian and hydraulic removal of soil; torrential thundershowers have attacked unprotected ground surfaces and stripped soil away; and melting snow has eroded ground thawed only near the surface. By these and other means, soil has been removed from the uplands and hill slopes and subsequently carried downstream or deposited on the floodplain of the Little Platte or other rivers.

Such deposition along the Little Platte River upstream from Smithville has been accelerated over the past 150 years by the building of mill dams and bridges, which impeded the free discharge of water, especially at flood stage. Such temporary impounding of the flood waters resulted in its spreading over the bottomlands where the alluvium has been deposited. The frequently reported flooding is only partly a meteorological phenomena; the absence of the water-absorbing capacity of extensive forests and mature native soils is probably a major factor in the reported increasing frequency and magnitude of floods in the valley.

In a qualitative fashion, we have attempted to outline the extent of environmental change in the Little Platte valley in the past century and a half. We conclude that the degree of change is so great that present-day conditions cannot serve as a direct analog for any period in the prehistoric era. Because variability is inherent in the climate of the area (as recorded in modern instrumental observations), however, we suggest that past climatic conditions were likewise characterized by relatively great variability. The location of Smithville in northwest Missouri, in the south central part of the continent, makes it vulnerable to climatic influences from different source regions, none of which are likely to have been thoroughly dominant in the prehistoric past. From a theoretical point of view, models of prehistoric climatic conditions which feature monolithic subdivisions (i.e., very long periods of stable, consistent weather patterns) are unrealistic. In an area such as northwest Missouri, which is in a transitional zone or ecotone between the Plains and the Eastern Woodlands, climatic variability is virtually axiomatic, in the past as well as the present.

As mentioned above, a major reason for pursuing research on the subject of recent environmental change in the Little Platte valley was to aid in interpretation of some of the sites that we excavated. The combined impact of climatological conditions, geomorphic processes, and Euro-American activities on these prehistoric sites is evaluated in

Chapter IV ("Some Effects of Euro-American Activities and Geomorphic Processes on Investigated Sites"), following Chapter III on the geology and geomorphology of the Little Platte valley. This chapter includes the project geologists' assessment of the magnitude of change in the floodplain morphology in recent generations.

CHAPTER III

GEOLOGY AND GEOMORPHOLOGY OF THE LITTLE PLATTE VALLEY: BACKGROUND TO IDENTIFYING AND TESTING LANDFORMS FOR BURIED ARCHAEOLOGICAL SITES

by George D. Gardner and Jack Donahue

PURPOSE

An archaeological survey of the Smithville Lake area prior to 1979 (O'Brien 1977) reported that the number of Archaic and Early Woodland sites found was conspicuously low. Among the reasons suggested for this low number was that sites from these periods might be buried by geologic processes associated with the development of the Little Platte drainage system. Consequently, a geologic and geomorphic study was recommended to determine if buried archaeological sites occur in the study area, and if so, where such sites might be located.

The purpose of this study was to use geology and geomorphology to establish whether or not buried Archaic and Early Woodland archaeological sites occur in the study area, and to predict the most probable locations for buried archaeologic sites. In addition, a reconstruction of the geological and geomorphic history was to be undertaken to aid in archaeological interpretations, and to serve as a background for future studies in the region.

GENERAL PHYSIOGRAPHIC AND GEOLOGIC SETTING

The Little Platte River lies in the Dissected Till Plains region of the Central Lowlands Physiographic Province of northwestern Missouri (Chapman 1975: 2). Archaeologists refer to this area as the Northwest Prairie Region (Chapman 1975: 3). The Little Platte River is an eastern tributary of the Platte River (Mo.), which is, in turn, a tributary of the Missouri River (Figure 3-1). The Little Platte River is a 5th order stream as determined by the Strahler method of stream ordering on 7.5 minute U. S. Geologic Survey topographic maps (Gregory and Walling 1973: 43-44). The Little Platte River is approximately 70 kilometers long with a drainage area of about 775 square kilometers. The drainage system lies at elevations ranging from about 790 to 1000 feet MSL (about 240 to 300 meters) from its confluence with the Platte River to its headwaters. The vertical relief in the Little Platte Valley is approximately 40 meters from the valley floor to the uplands in the middle and lower portions of the drainage system where most archaeological sites occur.

The Little Platte River flows along a course developed primarily in Kansan glacial drift deposits and Pennsylvanian age shale and limestone bedrock. Pleistocene glaciation was a major factor in developing the Little Platte drainage. Of the four major glaciations that occurred in

the midcontinent (Nebraskan, Kansan, Illinoian, and Wisconsin), only the Kansan is thought to have directly glaciated the Little Platte Valley. Kansan till and bedrock forms the "superstructure" of the valley and uplands, while middle to late Pleistocene loess deposits veneer both the uplands and some landforms in the valley bottom. The loess may range from Illinoian to early Holocene in age.

The major landforms of the Little Platte Valley pertinent to this study are three paired river terraces. The two lowest terraces occur throughout most of the Little Platte Valley. The highest of the three terraces lies about 10 meters above the river and occurs only as small remnants in limited portions of the valley. The areal distribution of the terraces is shown on Figure 3-2b; the geologic cross-section is shown on Figure 3-3. Other notable landforms occurring within the Little Platte Valley include meander scars within the two lowest terraces, colluvial soil accummulations at the foot of slopes and in swales, and small scale erosional forms such as gullies and rills on valley slopes and uplands.

DEFINING THE GEOLOGIC LIMITS OF THE STUDY

The cultural periods of interest in this investigation are the Archaic and Early Woodland periods, between about 8,000 and 2,500 years B. P. (Chapman 1975:27). The most significant geologic events in the Little Platte Valley affecting burial and/or erosion of archaeological sites from these periods are thought to be:

1. Widespread deposition of wind-blown loess that may have occurred in the late Pleistocene during periglacial climatic conditions, and in the early Holocene during the arid conditions of the Altithermal;

2. Reworking and redeposition of the loess and/or other sediments by colluvial processes during the Holocene;

3. Development of river terraces, flood plains, and associated features along the Little Platte River and its tributaries during the Holocene.

The geomorphology and stratigraphy of the Little Platte Valley reflects numerous adjustments of the entire valley to changes in climate and geologic environment that have occurred since the beginning of the Pleistocene. Thus, the Pleistocene history of the entire Little Platte Valley had to be examined before the history of any of its segments could be understood.

METHODOLOGY, TECHNIQUES, AND PROGRAM OF INVESTIGATION

A buried archaeological site, as defined for this investigation, is any archaeological site having contextual integrity and not detectable by surface survey. Predicting where areas occur that may contain buried archaeologic sites necessitates developing a locational model that

delimits loci of sedimentation during the time interval of interest, in this case, the Archaic and Early Woodland periods. Some locational models used previously by archaeologists have been based on the landform associations of known archaeological sites. This type of "locational" procedure can be summarized as:

1. A buried archaeological site (or sites) is discovered by accident or by design;

2. The physiographic (landform) context of the site is determined;

3. The archaeologist then tests other locations with similar physiographies.

The success of this approach is undenied and attests to the validity of its use for locating buried archaeological sites (cf., Chapman 1977: 1-3). However, use of this approach as the sole method for locating buried sites can result in a failure to determine all possible loci of sedimentation that could bury archaeological sites. The method also fails to establish a temporal framework that delimits areas where no archaeological sites could occur because the landforms are either too old or too young to contain buried cultural materials.

The strategy employed in the present study was to determine the changing patterns of the paleoenvironment and geomorphic history in sufficient detail to delimit loci of sedimentation, both temporally and spatially, where burial of cultural material could have occurred during the span of prehistoric occupation, and to delimit those areas where archaeological sites may have been removed by erosion or do not occur because the landforms postdates the occupational periods under investigation. The procedure used in this approach was as follows:

1. A detailed paleoenvironmental, geologic, and geomorphic history of the Little Platte Valley was developed independent of the archaeology;

2. The geologic and geomorphic history was used to develop a model that identified those landforms where natural deposition could have buried archaeological sites within the time-frame under investigation, and also to identify those localities where such sites probably would not occur, because of age or geology;

3. The model was tested by analyzing the distributions of known surface sites, and by excavating deep test pits into the landforms identified by the model to verify or deny the existence of buried archaeological sites.

Reconstructing the geologic and geomorphic history of the Little Platte Valley was accomplished by a detailed study of the deposits and landforms (geomorphology) in the drainage basin. The landforms and deposits were compared to each other and to other landforms and deposits in the surrounding region, using the following techniques:

1. Review of the literature to generate a preliminary understanding of the geology and geomorphology of the Little Platte Valley.

2. Studying and mapping the landforms in the Little Platte Valley pertinent to the reconstruction of the geomorphic history. This was accomplished mainly by a terrain analysis using stereographic, black and white aerial photographs obtained from the Corps of Engineers (C.O.E.) and the U. S. Geological Survey. Contour intervals on topographic maps of the area were not "sensitive" enough to delimit landform subtleties that were important to this investigation.

3. Geologic profiles of the deposits in the valley were obtained by using data from existing boring logs and detailed surface survey profiles for sediment ranges made by the C.O.E., and by test pits and borings conducted by GAI as part of this investigation. Test pits were excavated by a tractor-mounted backhoe with a maximum depth of penetration of about 3.5 meters. Borings were drilled by a Bombadier-mounted drill rig capable of drilling and sampling several tens of meters. The data points that were used for this investigation are shown on Figure 3-2a. Test pits and borings excavated for the geologic study range from Numbers 1 to 82 and are indexed on Figure 3-2a. Test pits excavated for the deep testing of landforms for buried archaeological sites range from numbers 83 to 162 and are shown in locality groupings on Figure 3-2a. A summary of Test Pit and boring data is presented in Appendix D-VII. C.O.E. borings are not numbered on Figure 3-2a but are shown to demonstrate the density and general location of these data points.

4. Laboratory analyses were used to compare deposits from the Little Platte Valley to each other, and to deposits from other areas in northwestern Missouri, in order to establish geologic associations and the relative chronologies of the landforms from which they were obtained. The analyses included determination of clay mineralogy by x-ray diffraction; determination of particle-size characteristics by pipette analysis; and determination of surface microtextures of silt sized particles using Scanning Electron Microscopy. In addition, two radiocarbon age-dates were obtained to aid in determining the age of terrace deposits. The details of the laboratory analyses are given in Appendices D-I through D-IV.

5. The paleohydrology of the valley was estimated by inference from paleoclimatic and vegetation reconstructions, and by analysis of the morphometrics of present and past fluvial landform features. Morphometric parameters included present and past channel gradients measured from C.O.E. and GAI boring and survey data; present and past valley gradients measured from C.O.E. topographic survey data on river terraces; present and past channel widths and depths measured from C.O.E. and GAI survey and boring data; and estimation of present and past channel sinuosity using stereographic aerial photographs.

The geomorphology of an area is sensitive to changing patterns of climate and vegetation; hence, reconstructing the geologic and geomorphic history of the Little Platte Valley required a knowledge of the changing climatic and vegetational patterns and their associated impact

on the geologic processes in the valley. Changing climatic and vegetational patterns were determined by a synthesis of data from the literature, and by attempting to obtain a pollen profile from sediments in meander scars.

Meander scars were determined to be the only areas where pollen might be sufficiently preserved to obtain a pollen profile. Several meander scar deposits were sampled using backhoe trenches and borings. Most samples obtained for pollen analysis were too oxidized to preserve pollen, and a pollen profile could not be obtained. Therefore, paleoclimatic and vegetational changes had to be reconstructed from the literature and inferences derived from paleohydrologic (morphometric analysis) studies.

The reconstruction of the geologic and geomorphic history of the Little Platte Valley provided the knowledge required to identify loci of late Pleistocene and Holocene deposition and erosion, and to develop a model for determining loci of sedimentation and possible burial of archaeological sites. The locations of these loci were mapped using air photo analysis.

The model for locating potential localities of buried archaeological sites was tested by: 1) studying the relationship between landforms and known archaeological sites found by surface survey, and by; 2) deep testing some of the potential loci by using a backhoe. Two out of nine loci tested produced buried cultural material. This was considered significant since many other test excavations were made in the flood plain setting for geologic, not archaeologic purposes (see Figure 3-2a), and none contained cultural materials. In addition to locating loci of buried sites, the more recently formed formations where the older archaeological remains could not be buried were successfully identified.

In the course of identifying and mapping possible loci for buried archaeological sites, localities of potential surface sites were also identified. These locations were determined by: 1) identifying those landforms where deposition would not have buried sites, allowing cultural material to be detectable by surface survey; 2) using stereographic aerial photographs to define land forms exhibiting potential for prehistoric habitation on the basis of past and present positions of the river and the distribution of known archaeological sites elsewhere in this region. Fifty areas identified by this process were tested by surface survey and 12 reportable archaeological sites were found.

The results of this investigation are reported in this chapter, beginning with a discussion of the bedrock and preglacial drainage of the area, followed by discussions of the Kansan glaciation and establishment of Little Platte drainage. Discussion then moves to the post-Kansan age geomorphic development of the landforms and deposits in the Little Platte Valley and their relationship to late Pleistocene and Holocene climatic, vegetational, and hydrologic changes. The historical geomorphology for the Little Platte drainage is synthesized from these interrelated findings. A model is then presented for determining loci of deposition and erosion in the late Pleistocene and Holocene, and locating potential loci for buried archaeological sites. Finally, the

conclusions regarding the occurrences of archaeological sites in the Little Platte Valley are summarized and placed in perspective.

BEDROCK GEOLOGY

The bedrock of the region is composed of relatively flat-lying Pennsylvanian age interbedded shales, limestones, and sandstones which occur within the Lansing and Kansas City groups of the Missouri series (Burchett 1970). Except for outcrops along river bottom and limited areas of the valley slopes of the Little Platte River, these units are covered by Pleistocene till and loess, and Pleistocene through Holocene alluvium. Figure 3-2b shows some (not all) areas where rock outcrops or comes within a meter of the surface along the valley slopes. A map by Hinds and Greene (1917) shows that the bedrock is flat with a slightly undulating (open-folded) structure. The regional dip is about 12 feet per mile west-northwest, but minor anticlinal and synclinal structures can cause variations of up to 20 degrees in any direction (Hinds and Greene 1917: 9).

Bedrock geology plays an important role in the location of nickpoints (e.g., rapids, water falls, contrictions in valley floor). Nickpoints are areas where rivers are often easily forded and provide a source of lithic materials when thick soil deposits cover most rock in the valley. In addition, nickpoints are areas of changing river dynamics; erosion and deposition are often concentrated at specific localities. For example, erosion mainly within nickpoint and; deposition in certain areas above and below the nickpoint. Location of buried sites on the Little Tennessee River in Tennessee is believed to be indirectly associated with nickpoints and valley constrictions (Chapman 1977: 2). Thus, understanding nickpoint development serves both the geological and archaeological aspects of this investigation.

The Pennsylvanian limestones of this region tend to be resistant to fluvial erosion, while the shales are more easily eroded. Hinds and Greene (1917: 2 and 10) recognized that varying rock resistance effects the morphology of stream valleys in this region. Dahl (1961: 44-52) has also recognized bedrock effects on the morphology of the Missouri River Valley. Our study attempted to ascertain how varying bedrock resistance might control nickpoint location and how such points might have affected the historical geomorphology of the valley.

Because Pleistocene and Holocene sediments overlie much of the Pennsylvanian bedrock surface, Smithville Dam and vicinity was the only area where sufficient geologic data was available for such assessment (see Figure 3-2a). Here, numerous Corps of Engineers borings allowed construction of a geologic cross section (Figure 3-4) and a bedrock surface contour map (Figure 3-5). The bedrock surface configuration at Smithville Dam essentially corresponds to the suggestions of Hinds and Greene (1917: 10). They stated that resistant limestones form cap rocks in the valley bottoms, which result in flat gradients such as found on the Raytown and Cement City limestones (Figures 3-4 and 3-5). Nickpoints form where the limestone has been breached by stream erosion and downcutting occurs in less resistant shale. This process forms a steep face or series of steep faces with increased gradient and generation of

water falls and rapids (cf., the steep face between the Cement City limestone and Quivara shale in Figure 3-4). Thus, variations in rock resistance appears to be one causative factor for nickpoint formation in the Little Platte Valley.

Geologic maps for the region are not accurate enough to predict location of nickpoints based on rock type; however, a crude estimation of where bedrock might cause nickpoints could be made using the structural contour map and gas well logs reported by McQueen and Greene (1938: 144, 145, Plate 1). From this evaluation, it appears that both the Smithville and Hixson Mill-Mecca areas (Figure 3-2b) are located at the point where the river has incised through the limestone caprock into less resistent underlying shale along the valley bottom, forming a nickpoint. Unfortunately, recent silting-in of the channel has buried these locations of probable outcrop, and the rock bottom was not observed.

Mills and bridges are often located at natural nickpoints since shallow bedrock provides a sound foundation for the mill dam while also constricting the flow of water. All three mill sites in the Little Platte Valley (Figure 3-2b) were located at nickpoints. The river at Ross's Mill traverses the sequence of rock between the Argentine and Raytown limestones (see Figure 3-4 for reference) and the varying rock resistance may be causing the nickpoint. However, part of the development of the nickpoint at Ross's Mill may be due to its proximity to a preglacial drainage divide since nickpoints are also formed in areas where preglacial divides were breached. This aspect of the Little Platte Valley geology is discussed in the next section.

PREGLACIAL DRAINAGE

Definition of the pre-glacial topography and drainage pattern in the Little Platte Valley is important in developing a complete picture of the geologic and geomorphic history during the Pleistocene and Holocene. The bedrock surface beneath the glacial drift was interpreted to be the pre-Kansan topographic surface by Dreezen and Bayne (1971: 21). Bedrock contours and pre-glacial drainage patterns mapped by Heim and Howe (1962) in northwestern Missouri show a dendritic configuration similar to the maturely dissected topography of the nonglaciated area just south of the region, in the Central Lowland Physiographic Province of Chapman (1975: 2) or the Osage Plains of Hinds and Green (1917: 1).

Pre-Kansan drainage systems were quite different from present ones. The two major pre-Kansan drainage systems for northwest Missouri were the southeast trending "Grand River Valley" and east trending "Lower Kansas River Valley," located north and south of the present Little Platte Valley, respectively. (Quotation marks are used for all pre-Kansan drainage systems, which are now buried valleys, to distinguish them from existing drainage patterns.) The "Fishing River Valley," a tributary to the "Lower Kansas River Valley," underlies and bisects the present Little Platte Valley, as shown on Figure 3-6.

The Little Platte River crosses several preglacial drainage divides which were interfluves of the "Fishing River Valley" (Figure 3-6). Development of the Little Platte Valley required a breaching of these preglacial drainage divides by erosional downcutting. The remnants of these former drainage divides now form narrow, bedrock walled portions of the valley, as observed at the narrow portion of the valley just south of the Trimble Wildlife Management area (Figure 3-2b) and referred to in other chapters of this report as Ross's Mill gap. The preglacial divide was located between the "Fishing River," and a "lesser tributary" that extends south and west (Figure 3-6).

A pre-Kansan age for the "Fishing River Valley" and the "lesser tributary" is documented by the occurrence of glacial deposits within the bedrock valleys of both. For example, glacial till occurs in the "lesser tributary" bedrock valley at the Smithville Dam (Figure 3-4) and is reported within the "Fishing River Valley" (Heim and Howe 1962). By contrast, glacial till does not occur beneath the valley slope or bottom of the bedrock narrows, although it does occur on the uplands. The zone of shallow rock in the bedrock narrows is shown in Figure 3-2b.

Absence of glacial till within the valley slope and bottom of the bedrock narrows seems to indicate that the erosion of the narrows post-dates Kansan till deposition. Rock Branch (Figure 3-2b), which penetrates the rock of the bedrock narrows, does not contain glacial till, which implies a post-till origin of the erosional event that formed the narrows. Thus, bedrock contours north and south of the narrows probably depict a preglacial topography whereas the bedrock narrows were formed after till deposition by erosion through the former drainage divide.

The Little Platte Valley upstream from the bedrock narrows near Ross's Mills is noticeably wider and has greater sinuosity (Figure 3-2b) than it has downstream. Hinds and Greene (1917: 2) recognized this and attributed it to a coincidence of the Little Platte Valley with the "Fishing River." In terms of drainage basin form and process, the bedrock narrows acts as a nickpoint, with increased sinuosity above the nickpoint and decreased sinuousity within and below it. This is caused by the river dynamics and the associated channel gradient required to adjust to the nickpoint.

PLEISTOCENE GLACIAL AND INTERGLACIAL PERIODS

No Nebraskan till has been definitely identified south of the preglacial valley running roughly between St. Joseph and Gallatin, Missouri, well to the north of the Little Platte Valley (Howe 1968: 11). This preglacial valley may have been the southern boundary for the Nebraskan glaciation (Howe 1968: 12). However, Nebraskan glacial ice may have reached the Little Platte Valley since it is well documented in northeastern Kansas, Nebraska, Iowa and northwestern Missouri (Dort 1965, 1970, 1972; Bayne 1969; Howe 1968). Based on available data, we infer that the major effect of Nebraskan glaciation was to either deepen the preglacial drainage pattern and/or to deposit alluvium from glacial outwash in the Little Platte Valley.

There is no indication of direct Illinoian or Wisconsin glaciation in the Little Platte region (Frye and Leonard 1952: 193-199). The only well-documented glaciation to affect the region of the Little Platte River was the Kansan (Hinds and Greene 1917: 10; Heim and Howe 1963; Howe 1968: 12-13; Bayne et al. 1971: 5-6) prior to about 900,000 years ago (Wollin et al. 1971: 212). The result of this early glaciation was to modify the preglacial bedrock topography by filling in valleys with glacial drift and depositing thin to thick sequences of glacial till on the uplands. The maturely dissected bedrock topography of the region was converted into a gently rolling "till plain" (Howe and Heim 1968: 18).

During retreat of the ice in late Kansan time, new drainage patterns became established in northwestern Missouri. The existence of a proglacial isostatic bulge during the Kansan (Flint 1957: 409-427) may have locally increased north-south stream gradients at this time. A similar situation is postulated for the generation of a glacial spillway with rapid downcutting for the Smoky Hill Valley spillway in Kansas, a feature which developed within 25 miles of the retreating Kansan ice front (Frye and Leonard 1952: 190).

The initiation of the Missouri River, which did not exist in preglacial time, is important to this study as it forms a major base level for all streams in the region. Most workers agree that the Missouri River came into existence contemporaneously with or just after the Kansan glaciation (Hinds and Greene 1917: 10; Davis 1955: 150-151; Dahl 1961: 160; Howe and Heim 1963; Howe 1968: 14; Bayne et al. 1971: 7). It is possible that its basic course developed in stages in northeastern Missouri, with some portions forming as an ice marginal drainage system during Kansan glaciation, and other portions, such as that between St. Joseph and Kansas City, forming subsequent to glaciation (Davis 1955: 150-151; Schmudde 1960: 20-72). Even though Illinoian terraces are not fully recognized in the Missouri Valley, most workers agree that the present course of the Missouri River was established prior to Illinoian time since many terraces on tributaries of the Missouri River are identified as Illinoian in age and are graded to the present Missouri Valley.

Although the exact time for initial development of the Little Platte drainage cannot be positively established with present data, it seems likely that it is late Kansan or immediately post-Kansan in age because: 1) the absence of glacial till in the bedrock narrows implies the narrows were formed after till deposition; and 2) erosion of the drainage divide now represented by the bedrock narrows required a substantial amount of flow that may have been available in late Kansan or early post-Kansan time.

In the late Kansan and early post-Kansan period there would have been abundant glacial meltwater which could have caused rapid downcutting through the Kansan till plain and the bedrock divide located south of Trimble Wildlife Reservation. The existence of thick and extensive deposits of glacial till in the Little Platte Valley (e.g., Hinds and Greene 1917, and Figure 3-2) attests to the Little Platte River's inability to remove these deposits since the Kansan. Thus, after initial Kansan and early post-Kansan downcutting, the Little

was first recognized and described, which is only 18 kilometers southwest of the Little Platte Valley. Howe and Heim (ibid: 17-18) believe that the Ferrelview Formation was formed by colluviation, alluviation, and accretion-gley processes on the Kansan till plain during the middle Pleistocene. Thus, the origin and thickness of Wisconsin age loess on the uplands of the Little Plate Valley is not clear.

Laboratory analyses were used to help decipher the upland deposit problem; to facilitate recognition of buried soil horizons; and to correlate various deposits from different areas in the Little Platte Valley and vicinity. Particle (pipette) size, scanning electron microscopy (S.E.M.), and x-ray diffraction (XRD) clay mineralogy were conducted on 19 samples collected from various geologic deposits in the study area and the surrounding region. Sample localities, test pit designations, and testing schedules are present in Table D-6 of Appendix D-VII.

Of the 19 samples collected for testing, three were of loess from the upland loess deposits beyond the Little Platte drainage, and two were from the Little Plate Valley upland. These samples included one of Bignell loess from the Missouri River bluffs about 30 kilometers west of the Little Platte Valley (Figure 3-1), one of Peorian loess from Platte County about 15 kilometers west of the valley (Figure 3-1), and three from the uplands the Little Platte drainage (Figure 3-2b). Two were of the loess-like upland deposits from the same test pit (Test Pit 35 on Figure 3-2b), one from 0.4 meters below the surface (shallow) and the other 1.6 meters below the surface (deep). The third upland sample in the Little Platte drainage was of the Kansan glacial till (Test Pit 5 on Figure 3-2b).

The clay mineral analysis provided the most useful data, while the particle size and S.E.M. data were moderately helpful with interpretations. The clay mineral data is presented in four different ways in Figure 3-7: (1) percent montmorillonite, (2) diffraction intensity ratio (D. I. ratio), (3) occurrence of mixed-layer clays, and (4) a factor analysis of mineral composition. The details of the clay mineral analysis and a discussion of the data are given in Appendix D-I.

Based on the clay mineralogies shown in Figure 3-7, the deep upland deposit seems to be most closely associated with the Kansan glacial till while the shallow upland soil seems to associate with Bignell Loess. Both the till and deep upland soils contain lesser amounts of montmorillonite and greater amounts of mixed-layered minerals, and both have D.I. ratios less than 1.0. The shallow upland soil and Bignell Loess are similar in that they both have larger amounts of montmorillonite and neither contains mixed-layered minerals.

The Peorian loess is similar to the deep upland soil only in its low montmorillonite content, and is dissimilar in the other three presentations. The Peorian loess is similar to the Bignell loess and shallow upland soil in the lack of mixed-layered minerals and higher D. I. ratios, but differs in montmorillonite content.

The factor analysis is believed to be the strongest comparative analysis of the four presented in Figure 3-7 because it compares all

mineral constituents based on percentages of illite, kaolinite, montmorillonite and mixed-layered minerals. The factor analysis relates the shallow upland soil to the Bignell Loess, and the deep upland loess-like soil deposits to the Kansan Till.

Exposed profiles of the upland soils observed within the Little Platte drainage show no evidence of stratigraphic discontinuities in the loess deposits. Leaching and weathering may have obscured any observable paleosols that would have indicated multiple depositions of loess. Weathering plays an important role in the clay mineral composition of soils since it can alter the clay mineralogy. Weathering usually proceeds downward in the soil profile, being most intense near the ground surface and decreasing in intensity with depth (Birkeland 1974: 174). Soils experiencing leaching and oxidation often show depletion of montmorillonite and enrichment of kaolinite and mixed-layered clay minerals in the upper part of the profile (Birkeland 1974: 99-100). The upland deposits of the Little Platte Valley are oxidized and leached and one would expect depletion of montmorillonite in the shallow soil. However, the data in Figure 3-7 shows the reverse situation occurs in the upland deposits of the Little Platte drainage.

When compared to the deep upland soil, the shallow upland soil is richer in montmorillonite and deficient in mixed-layered clay minerals. The high montmorillonite and lack of mixed layered minerals in the shallow upland soil may indicate that the shallow soil is not as weathered as the deep soil, implying a younger age or different parentage for the shallow soil. This supports the other laboratory findings that the shallow soil (less than about 0.7 meter based on soil profile stratigraphy in geologic test pits) is associated with the Bignell loess event, and the deeper, loess-like soil may be much older in age since it seems to be more like the glacial till.

The origin of the deeper, loess-like upland soil is difficult to ascertain. It appears loess-like in texture; however, Howe and Heim (1968) and Dahl (1961: 113-117) describe similar upland deposits that they believe are not related to loess. Howe and Heim (1968: 14) report that the D.I. ratios for the silty portions of the Ferrelview Formation are generally less than 1.0. Particle size analysis of the deep, loess-like upland soil shows that it is composed mainly of silt and that it has D. I. ratios less than 1.0 (Fig. 3-7), similar to the Ferrelview Formation. The close similarity of the deep upland soils and till in the clay mineral analyses (Figure 3-7) supports the possibility that the till could be the parent material for the deep, loess-like upland soil, a relationship similar to that postulated for the Ferrelview Formation.

Particle size analysis of the upland soil deposits also supports an association between the deeper upland deposits and the Kansan Till. Table 3-1 presents the grouping of these deposits based on characteristics in their modalities from their particle size curves (particle size curves and their descriptions are given in Appendix D-II). Note that the deep upland soil groups with the Kansan Till.

A different line of evidence suggesting that the deep upland soil may not be loess was derived from a paleontologic study (see Appendix D-V for details). Paleontologist Dr. H. B. Rollins concluded,

independent of the other geologists on the project, that much of the upland soil does not appear to be loess and that in fact, extensive loess deposits may be absent along the margins of the Little Platte Valley. His conclusion is based mainly on the absence of a gastropod fauna within the deep upland soils. Loess commonly contains abundant gastropod fauna, although leaching can remove them.

Thus, the deeper upland soil does not appear to be Bignell loess. Its exact origin remains undetermined. It may be loess as previous investigators have reported, or it may have originated by weathering from the underlying Kansan till similar to the postulated origin for the Ferrelview Formation. Unfortunately, the sampling and testing for this study is too limited to offer a definitive interpretation regarding the origin of the deep upland soil. Whether or not the deeper upland soil deposit is Loveland or Peorian loess, or belongs to the Ferrelview Formation, we can safely conclude that it is old and not associated with Bignell or more recent eolian depositional events. Therefore, thick eolian deposits (greater than about one meter) recent enough to bury Paleo-Indian or younger archaeological sites probably do not exist on the uplands of the Little Platte Valley.

MIDDLE TO LATE PLEISTOCENE AND HOLOCENE TERRACE DEVELOPMENT

Neither Wisconsin nor Illinoian glacial ice entered the Little Platte Valley. Both ice fronts were far enough from the Little Platte Valley that the drainage did not serve as a glacial sluiceway. However, the periglacial and interglacial environments of this time were responsible for generating the geomorphic features presently observed in the Little Platte valley. The major factors influencing present Little Platte Valley fluvial geomorphology were: climatic and vegetational variation which controlled discharge and sediment load, and overall weathering and erosional processes in the valley; and deposition of loess, which added to sediment load and covered previous landforms. The major landforms in the Little Platte Valley related to these factors are river terraces.

River terraces reflect various equilibrium levels of the river. The equilibrium level is controlled mainly by the balance between sediment load and river discharge. Terrace building is often associated with loess deposition as the river responds to the increased sediment load, relative to discharge, caused by the deposition of loess (Davis 1955: 171-173). The river reacts to the increase in sediment by building its flood plain. The terraces form when the river incises through its flood plain as sediment loads decrease in time. Renewed increases in sediment load, such as deposition of more loess, might cause a new cycle of terrace building. This is an oversimplification of the process since many other factors are involved, but it is the generally accepted explanation for terrace building associated with loess deposition.

Both Illinoian and Wisconsin terraces are recognized in northwestern Missouri. Age assignment is based on topographic position,

geomorphic expression, sediment stratigraphy, and soil profile characteristics. High elevation terrace remnants that occur between the upland Kansan till plain and the surface of the uppermost terrace considered to be Wisconsin in age are generally assigned an Illinioan age (Davis 1955: 158-160; Dufford 1958: 25-26; Bayne and Fent 1963: 376; Jamkhinder 1967: 3-4; Bayne et al. 1971: 7; Dean and Davis 1973: 10). For the Platte River (Mo.), an Illinoian terrace is recognized between 15 to 20 meters above the floodplain in northern Platte County (Davis 1955: 103, 158) while downstream, near the Platte's confluence with the Missouri, it falls to 7 to 10 meters above the floodplain (Dean and Davis 1973: 12-13). The Illinoian terrace surface is veneered by Wisconsin loess deposits and, in places, a well-developed Sangamon interglacial age soil profile occurs beneath the loess (Davis 1955; Dean and Davis 1973).

The advent of the Wisconsin glaciation about 100,000 years B.P. (Dreeszen 1970: 10) in the northwestern Missouri area involved at least two significant loess events; the Peorian and the Bignell. Radiocarbon dates for the Peorian loess event center around 22,000 years B.P. while those for the Bignell bracket an 11,000 years B.P. date (Dreeszen 1970: 18-20). Davis (1955: 160) and Dean and Davis (1973: 11) recognize two river terraces in the lower portion of the Platte (Mo.) River valley and they assign a Wisconsin age for their formation. Davis (1955: 164-165) attributed their formation to increased sediment load during the Wisconsin. Loess deposition could be a highly significant contributor to increased sediment load.

A number of geomorphic features are evident within the Little Platte Valley, some of which have a good correlation with comparable features described elsewhere in northwestern Missouri. Three terraces are present in the Little Platte Valley and are designated T_2, T_1, and T_0 in order of decreasing elevation. The location of the terraces within the Little Platte valley is shown on Figure 3-2b. Figure 3-3 is a generalized cross-section across the Little Platte Valley showing many of the major geologic features of the valley, including the glacial till, upland deposits, and T_2, T_1, and T_0 terraces. The discussion presented in the next few paragraphs summarizes our findings and interpretations regarding relationships between the terraces and geologic events.

Terrain analysis using stereographic aerial photographs was used to delineate the terraces and other landforms in the valley. The terrain analysis shows that both the T_1 and T_2 terraces are smoothly graded to the upland and tributary areas, imparting a drape-like appearance to the landscape. Drape-like topography is a characteristic of areas covered by loess. The T_2 terrace is similarly graded to the T_1 surface, but the T_0 surface sharply truncates both the T_1 and T_2 surfaces. These geomorphic relationships imply the T_1 terrace and the soil veneer on the T_2 terrace are associated with loess deposition. The truncation of the drape-like topography by the T_0 terrace implies that it post-dates loess deposition.

Terrain analysis also revealed that the T_0 terrace is not continuous throughout the length of the Little Platte River, rather, it only exists between the limits shown on Figure 3-8. In addition, the Platte

River has its own T_0 terrace that extends from its mouth at the Missouri River to a point about half the distance to the confluence with the Little Platte (Figure 3-8).

The T_0 terrace has erosional, scour-like features on its surface, particularly at its upper and lower limits and below nickpoints. The T_0 surface below Smithville appears to have formed primarily by scouring, which may be the result of floodwaters fluming through the nickpoint at Smithville. Smithville seems to be the downstream limit of lateral, cut and fill type terrace development for the T_0 surface, implying that the nickpoint at Smithville is acting as a local base level for the Little Platte River.

Both the areal limits and scour features indicate that the T_0 terrace is actively forming and has not reached the state of quasi-equilibrium implying that the T_0 is fairly young in age. Streams that have reached a state of quasi-equilibrium usually have more evidence of lateral erosion and deposition and greater sinuosity than the T_0 surface and present Little Plate River.

As previously mentioned, laboratory analyses were conducted on samples from various geologic features throughout the valley and the region (Appendices D-I through D-III). Figure 3-9 and Table 3-2 show comparative analyses for the clay mineralogies and particle sizes, respectively. Comparison of the clay mineralogies shows a definite association of the T_1 terrace sediments and the Bignell loess and the loess-related shallow upland soils. This relationship is particularly strong for the percent montmorillonite, absence of mixed-layered minerals, and factor analysis (Figure 3-9).

The deposits that veneer the T_2 terrace also associate with the Bignell loess and shallow upland soil. The deeper T_2 terrace deposits associate with the older deposits (Kansan Till, Illinoian Alluvium, Peorian Loess and deep upland deposits) in most of the presentations in Figure 3-9.

The T_0 deposits seem to vary in position on Figure 3-9, associating with the older deposits (Kansan Till, Illinoian alluvium, and deep upland deposits) in percent montmorillonite and mixed-layered minerals while seeming to lie somewhere between the Bignell loess/shallow upland/T_1 terrace deposits and the older deposits in the D.I. ratio and Factor Analysis. The impression given is that the T_0 terrace soils are a mixture of the older and younger deposits.

Particle-size analysis (Table 3-2) was interpreted using the modal characteristics in the various particle- size curves (Particle-size analysis and curve modality are described in Appendix D-II). Changes in particle-sizes of deposits are influenced by changes in the environments of deposition (e.g., eolian vs. fluvial), and by changes in flow regime within the same depositional environment. Therefore, comparisons of particle-size curves for eolian versus fluvial deposits is not a valid test to establish their contemporaneity. However, particle-size curves were compared to determine if any general relationships could be established.

Table 3-2 shows that both the Bignell and Peorian loess samples were bimodal in the fine fraction, as was one T_1 terrace sample. T_1 terrace sediments also were unimodal and bimodal in coarse fraction. This may be the result of the varying environments of deposition (eolian, fluvial, and colluvial) under which the T_1 terrace was formed, as opposed to the strictly eolian origin for the loess deposits. The T_2 terrace deposit groups with the older, Kansan Till and deep upland deposits, whereas the deposits veneering the T_2 terrace groups with the loess, just as observed in their comparative clay mineralogies. The T_0 deposits group both with the T_1 deposits and the older, Kansan Till and deep upland soils as they did in their comparative clay mineralogies, again giving the impression that the T_0 deposits are a mixture of the younger and older soils.

The S.E.M. analysis of microtextures of the soil deposits of the Little Platte Valley also tends to support an association between T_1 terrace soils and the Bignell loess. A detailed discussion of the S.E.M. analysis is presented in Appendix D-III. Visual comparisons of S.E.M. photomicrographs by 10 different analysts resulted in seven out of ten people grouping the T_1 terrace deposits with the Bignell loess (see Table D-3 in Appendix D-III).

From these relationships, and other observations in the Little Platte Valley, the following geologic relationships characterize the terraces:

1. The T_2 terrace is highly dissected and occurs as scattered remnants at elevations about 11 to 14 meters above the present T_0 and T_1 surfaces in the middle part of the drainage system (Figure 3-2b). Test trenches excavated in the T_2 terrace showed a fining upward sequence typical of alluvial sediments, and a deep highly oxidized weathering profile extending down to 1.65 meters. This was capped by a thin (0.4 meters) loess veneer (Figure 3-3). The profile is the most intensely weathered encountered in the Little Platte Valley and may represent the Sangamon paleosol.

   At most localities, the T_2 is veneered with late Pleistocene loess in a fashion similar to that described by Davis for the Platte River (Mo.) valley. Based on its highly dissected nature, elevation, grain size characteristics and clay mineralogy, the T_2 terrace may be Illinoian or Sangamon age. Therefore the T_2 terrace pre-dates prehistoric occupations.

2. The T_1 terrace is a continuous, paired, well-defined landform (Figure 3-2b). T_1 terrace formation is interpreted as a combination of loessial and alluvial processes with an indication that colluvial processes along the valley sides were also involved. SEM examination of surface microtextures on silt-sized grains (Appendix D-III) suggests that the terrace soils are an admixture of loess and fluvially transported grains. Both grain size distribution and clay mineralogy show the T_1 terrace sediments to be most closely related to the Bignell loess. Terrain analysis reveals T_1 terrace surface has a draped-like appearance suggesting it is covered and/or composed of loess. Therefore, the T_1 terrace might

be associated with deposition of the Bignell loess, and the T_1 terrace probably pre-dates Archaic occupation. This interpretation is tentatively supported by the results of an investigation of colluviation discussed later in this report.

3. The T_0 terrace is the lowest flood plain surface in the Little Platte Valley and it is apparently quite young. Both grain size analysis and clay mineral composition suggest that its sediments are a mixture of T_1 sediments and the older upland and Kansan Till soils. The T_0 terrace truncates the loess covered topography indicating it post-dates loess deposition. Thus, the T_0 sediments seems to be derived by erosion and redeposition of both the T_1 sediments and older upland soils. This indicates the T_0 surface has formed during a period of incisement, not only of the valley floor of the Little Platte River, but also of the upland and valley slope areas. Numerous scour features occur on the T_0 terrace, demonstrating that the T_0 terrace has not reached quasi-equilibrium and that it is a fairly young landform.

   A radiocarbon age-date of 450 +/- 150 years B.P. (GX-6311) was obtained from a wood sample contained in T_0 meander scar deposit along Crows Creek (Figures 3-2b and 3-8). The age and relative location of the meander scar in the drainage supports the contention that the T_0 terrace is quite young and post-dates the Early Woodland cultural period. The age of the T_0 and T_1 terraces are discussed further in the "Historical Geomorphology of the Little Platte Valley" section of this chapter.

LATE PLEISTOCENE AND HOLOCENE CLIMATIC AND VEGETATIONAL CHANGES

Changes in the flow regime and in the erosion and sedimentation history of the drainage system are closely related to changes in climate and vegetation. Knowledge of the climatic and vegetational changes are required for a reconstruction of the geomorphic history of the drainage system. The following is a synopsis of the climatic and vegetational changes suggested for the Little Platte drainage area based on published information.

12,000 to 10,000 years B.P.: The most recent phase of glaciation (Wisconsin) ended about 10,000 years ago with climate becoming warmer and drier. In the northern American Midwest, spruce dominant forests gave way to pine between 12,000 and 10,000 years B.P. (Wright 1976: 587, 589). In northeastern Kansas, closer to the Little Platte Valley, spruce forest dominated from about 23,000 to at least 15,000 years B.P. and was then replaced by mixed-deciduous forest and prairie between at least 11,000 and 9,000 years B.P. (Gruger 1973: 239).

10,000 to 5,000 years B.P.: The moderating trend of the climate accelerated, becoming warmer and drier, peaking somewhere between 8,000 and 5,000 years ago (Klippel 1971: 46). Prairie vegetation became dominant in northwestern Missouri, with only a few trees scattered in the valleys (Gruger 1973: 239).

5,000 to 550 years B.P.: The climate became somewhat moister and cooler at about 5,000 years ago; deciduous trees began to expand in the lowlands of northwestern Kansas (Gruger, ibid) and presumably in the Little Platte Valley. In the northern Midwest, the climate of the last 5,000 years has been interpreted as trending toward more moist conditions with lower temperatures (Klippel 1971: 45-46). Essentially the same climatic pattern is recognized in southeastern Missouri (King 1977: 32). Wright (1976: 590) contends that the trend in increasing moisture was gradual and continuous without long, distinctive breaks in climate pattern. However, Bryson et al. (1970) contend that this period may have been marked by periodic flucuations between warmer and drier conditions and cooler, moister periods. If such fluctuations occurred, their severity and duration must not have deviated much from the overall trend toward greater moisture since such fluctuations are not reflected in the pollen diagrams and paleovegetational reconstructions available for the mid-continent region.

500 to 125 years B.P.: The climate of the northern hemisphere became markedly cooler in many locations and considerably moister in Europe in a period which has been referred to as the "Little Ice Age" (Gribben 1978: 75). In the North American Midwest, the tendency for woodlands to encroach into those areas previously covered by prairie (Klippel 1971: 44) indicates that the climate may have also become cooler and moister in the midwest.

Our data for this period are limited but pertinent. According to Dr. James King, pollen analysis conducted on the samples obtained from a meander scar of Crows Creek in the Little Platte Valley indicate a vegetation much the same as would be expected today if deforestation and Euro-American agriculture had not occurred (see Appendix D-IV). A single radiocarbon date for the oxbow sediments containing the pollen is 450 +/- 150 years B.P. (GX-6311). Thus, at the time represented by this radiocarbon date, deciduous forests occupied the Little Platte bottomlands and the upper slopes. This evidence supports the climatic trend proposed by Klippel (1971: 44) for the northern Midwest. Some upland areas may have been sparsely wooded with forests gradually encroaching on the prairie.

125 years B.P. to present: Woodlands continued to encroach on the prairie along the southern margin of the prairie peninsula until the time of early Euro-American settlement when farmers began to deforest the area (Klippel 1971: 44). The climatic conditions that led to encroachment several centuries ago are presumed to be continuing at the present time, with some short-term fluctuations such as the drought conditions of the 1930's. If the vegetal reconstructions iterated above are correct, then this period may represent the greatest encroachment of deciduous forest on the Little Platte uplands since the late Pleistocene and early Holocene between 11,000 and 9,000 years ago. This also implies that the last 125 years may represent one of the moistest periods in the last 11,000 years.

LATE PLEISTOCENE AND HOLOCENE HYDROLOGIC CHANGES

The present drainage network of the Little Platte River is essentially dendritic and asymmetric, with less drainage area occurring west of the main stream than on the east (Figure 3-1). The drainage pattern and higher gradients of tributaries in drainage basins surrounding the Little Platte basin indicate that the Little Platte drainage basin may have lost, and continues to lose, watershed by drainage capture from encroaching tributaries of the surrounding drainages. Tributaries encroaching upon and capturing Little Platte watershed include those of the Platte River, Castle Creek, Fishing River, and Grindstone Creek (Figure 3-1).

The process of capturing watershed from the Little Platte basin would have occurred slowly through geologic time, and the net effect of the shrinking watershed would have been to reduce the discharge of the Little Platte River relative to surrounding drainages. However, the hydrologic changes pertinent to this investigation are believed to be related to more temporal factors such as changing climate and vegetation patterns than the long term effects of a shrinking watershed.

The hydrologic changes that occurred between the T_1 terrace and T_0 terrace fluvial events were estimated using a morphometric analysis of river channel, paleochannel, and terrace parameters. An analysis of morphometric parameters can yield a relative estimate of changes in flow regime (Gregory and Walling 1973: 235-291; Ritter 1978: 211-256; Schumm 1977: 135-137). The detailed morphometric measurements used for this analysis are not presented in this report, rather, Figures 3-10 to 3-13, and Table 3-3 are presented to summarize these relationships.

One of the most noteworthy differences between the T_1 and T_0 terraces is in their surface gradients. Surface gradients of terraces are relict "valley gradients" of the former floodplains. Figure 3-10 presents a longitudinal section and several cross-sections for the Little Platte Valley that shows the T_1 surface having a higher valley gradient than the T_0 surface.

Table 3-3 lists other differences between the T_1 and T_0 terraces. For example, the paleochannel gradient of the T_1 terrace is lower than the present channel gradient of the T_0 terrace and the width and depth of the T_1 was greater than the T_0. Measurement of width and depth of the T_0 (present) channel was accomplished by utilizing detailed C.O.E. Sediment Range Surveys (e.g., S.R.-6 on Figure 3-2a) and air photo analyses. Measurement of the width of the T_1 paleochannel was accomplished by measuring widths of meander scars in the T_1 from aerial photographs. The depth of the T_1 paleochannel was determined from test pit and boring data in a meander scar transected by Sediment Range 6 (Figure 3-2b). Figure 3-11 shows the profile configuration of alluvial deposits for the present T_0 channel and the T_1 paleochannel at Sediment Range 6. Figure 3-12 shows the width and depth relationships in this section of valley. Although the relative changes in width and depth could be assessed, the exact dimensions of change could not be determined.

The differences in sinuosity (meandering) between the T_1 and T_0 channels were determined by terrain analysis with stereographic aerial photographs. Meander scars in the T_1 terrace were assumed to be former paths of the channel during T_1 time. Most of the meander scars are shown on Figure 3-2b. Comparing the meander scars to the present channel suggests that sinousity has decreased from the T_1 to T_0 terrace events.

The changes from the T_1 to T_0 terrace events were compared to the general relationships reported by Schumm (1977: 135-136) for various changes in flow regime (Figure 3-13). From these relationships, it appears that the river discharge may have decreased from the T_1 to T_0 events, and that there may have been increased sediment load (in relation to discharge) for the T_0 event.

Stream flow measurements by the Corps of Engineers at Smithville since 1966, and previous observations of the discharge of the Little Platte River indicate that there are significant periods of time when flow is extremely low. No flow has occurred in the Little Platte River on several occassions in the recent past. The paleoenvironmental reconstruction indicates that the Little Platte drainage area was more arid during Archaic and possibly early Woodland times (9000 to about 1500 years B. P.) than since then. This aridity would have caused the Little Platte River to have been dry more often than now, and its flow may have been as intermittent with frequent periods of no flow.

LATE PLEISTOCENE AND HOLOCENE COLLUVIATION

Colluviation is the process of transporting soil by mass wasting processes (i.e., sheet erosion, unconcentrated runoff, soil creep). Our terrain analysis and test pit investigations indicate that colluvial sediments occur at the base of slopes and at the bottom of swales and gullies in localized areas of the Little Platte Valley. Therefore, the role of colluvial processes was examined to determine its impact on the geomorphic history and to determine its potential for colluvial sedimentation and burial of Archaic and early Woodland sites.

Many factors control the rate and intensity of colluviation, but the largest single factor is the presence or absence (sparseness) of vegetation (Carson and Kirkby 1972: 210). Changes in vegetation greatly affect the rate and intensity of erosion and colluviation. Based on his findings at Graham Cave in central Missouri, Klippel (1971: 46, 68) theorizes that the climatic change to more arid conditions between 7000 and 4500 years ago caused a retreat of the woodlands into the valleys and expansion of prairie from the uplands onto the valley slopes. Klippel (ibid: 71) suggests that the change from woodland to prairie vegetation and subsequent fluctuations in this border caused an increase in erosion of the silty soils from the uplands and slopes. Generally, this hypothesis agrees with the observation that soil erosion is much higher in more sparsely vegetated areas (Carson and Kirkby 1972: 208). In addition, areas with semiarid to arid climatic conditions, such as those postulated by Klippel, experience considerable changes in vegetal

cover and landscape in response to relatively small changes in rainfall (ibid: 349).

Semiarid conditions may have occurred in the Little Platte Valley about the same time as Klippel postulates for Graham Cave, and a similar increase in the intensity of upland and slope erosion probably occurred. In addition, the soil eroded from the uplands and slopes may have been transported to the base of the slopes and into gullies and swales where it was either carried away by erosion, or accumulated as colluvium where erosion was not active.

Figure 3-14 presents a generalized cross-section of a slope on a tributary gully of the Little Platte Valley where colluviation is recognized. The cross-section shows the relationship between the deposits, including: glacial till that forms the "super structure" of the gully; a silty, sandy clay containing pockets of pebbles and gravel overlying the till; a sandy, silty clay containing thin lenses of gravelly soil overlying the till on the slope; a clayey silt veneer on the uplands and slope that thickens toward the base of the slope and forms the bulk of the deposits in the bottom of the swale. The clayey silt filling the bottom of the tributary contains a thin, horizontal layer of buried organic soil that is believed to be a paleosol (this interpretation is discussed later in this section). The bottom of the tributary is graded to the T_1 terrace in the valley. The elevation of the buried organic layer is roughly coincident with the bottom of the tributary and is also equivalent to the T_1 surface in the main valley.

Laboratory analyses were conducted on several samples from the deposits depicted on Figure 3-14 as part of the analysis discussed in previous sections of this chapter (see Appendix D-I through D-III for details). Table 3-5 summarizes the results of the factor analysis for the clay mineral constituents of a select group of deposits that highlight the correlations between the slope and swale deposits. Table 3-4 shows an association between Bignell Loess, T_1 terrace deposits, shallow upland soils and the soil located above the buried organic layer in the tributary bottom. The soil below the buried organic layer is different from that above and does not group with any one factor, but fits best between factors I and II (between Bignell Loess and Glacial Till). The slope deposit overlying the till on the slope is similar to the Kansas Till and deep loess-like upland deposits that may be middle Pleistocene loess or some facsimile of the older Ferrelview Formation (see "Upland Deposits and the Loess Problem" section of this chapter). The upland deposit overlying the till also does not group with any particular factor but seems to fit best between factors I and III (Bignell Loess and older deposits including Peorian Loess, Illinoian alluvium, and the deep T_2 terrace alluvial soil).

As previously mentioned in this chapter, weathering of a soil under oxidizing and leaching conditions often depletes the montmorillonite and increases the kaolinite content in the soil profile. The soils in the tributary are, for the most part, oxidized, leached and fairly well drained, and one might expect depletion of montmorillonite and concentration of kaolinite occurs in the upper, most intensely weathered part of the soil. However, a reverse relationship is found in the clayey

silt deposits of the swale. Table D-1 of Appendix D shows that the soil above the buried organic layer has a slightly higher montmorillonite and lower kaolinite content (mont. = 45%; kao. = 20%) than the soil below the organic layer (mont. = 35%; kao. = 25%). This implies that the soil below the organic layer may be slightly more weathered, than the soil above the organic layer. This indicates that the soil above the organic layer was deposited after the underlying soil was weathered and had developed an "A" horizon at the surface. This soil was subsequently buried and became the organic layer or paleosol shown on Figure 3-14.

A radiocarbon assay was attempted on samples of the buried organic soil layer (paleosol) by Geochron Laboratories. Unfortunately the organic content was too low to yield reliable dates, and a scatter of dates ranging from 12,000 to 4,000 years B.P. (GX-6118) were obtained (results are given in Appendix D-4). Harold Krueger of Geochron Laboratories indicated that the true age probably lies somewhere within that range, but that further measurement (counting) would not produce a more accurate age determination. (See Appendix D-IV, Vol. II.)

Based on the field observations, terrain analysis, and laboratory tests, the geomorphic history of the swale and its slope (Figure 3-14) may be outlined as follows:

1. Deposition of glacial till in the early Pleistocene (Kansan glaciation) and subsequent deposition of the overlying sandy, silty clay sediment sometime between the Kansan glaciation and late Pleistocene, as indicated by the clay mineral similarities between this deposit and the older soils such as the Illinoian and T_2 terrace alluvium. The silty, sandy clay may have originated from Illinoian loess, or loessial colluvium, but there is no evidence to support or deny this possibility.

2. The tributary was developed in the middle to early-late Pleistocene by erosion of the till and the overlying deposits, and by mass wasting processes contemporary with tributary formation. The slope deposit overlying the till is colluvium derived from the till and the upland deposits, as indicated by its structure, texture, particle-size characteristics and its clay minerology.

3. The deposits below the paleosol were probably formed during the late Wisconsin, possibly in association with late Wisconsin loess deposition because: a) a radiocarbon assay (GX-6311), although dubious, indicates the deposit may date somewhere between 12,000 to 4,000 years ago; b) it does not have a well developed weathering profile that an older, middle Wisconsin (Peorian) soil might be expected to have; c) S.E.M. analysis (Appendix D-III) and clay mineral comparisons indicate its composition is intermediate between Bignell Loess, the Till, and the colluvial soil; d) the paleosol seems to represent a buried portion of the T_1 terrace, and the T_1 terrace is believed to be late Wisconsin in age.

4. The former surface of the tributary bottomland, represented by the paleosol, was covered by a veneer of colluvial deposits similar in clay mineral composition and microtextures to the Bignell loess and shallow upland soils. The burial was rapid enough to preserve the

organic content of the paleosol. Burial may have occurred somewhere between 12,000 and 4,000 years ago.

The clayey silt deposit is quite thick in the swale bottom but not on the upland, which may indicate that it was formed mainly by erosion from the uplands and slopes, and colluviation into the swale bottom. Based on the theoretical relationship between increased erosion and colluviation with increased aridity and vegetal change, the "best fit" time-frame for the major period of colluviation would have been between about 8000 and 4000 years ago, during the Archaic cultural period.

Thus, colluviation may have been an important geologic process during the Archaic cultural period. However, colluvial soil accumulations are only preserved where erosion at foot-slopes was not sufficient to remove colluvial deposits. Therefore, significant colluvial soil deposits only occur at specific locations in the valley. The swale illustrated in Figure 3-14 is a typical location where erosion has not removed the colluvial deposits. However, significant archaeological sites would not be expected to occur in the confined setting of such a swale, and more promising localities are suspected to be closer to the main river and larger streams.

A refined model for locating these colluvial slopes which would have the best potential for containing sites was not developed in this study. However, we did identify four colluvial foot-slopes that were subsequently tested (see Appendix D-VII and Figure 3-2b). Of the four foot-slopes tested, the most productive sites were the two located on the downstream side (leeside) of a hill or other "protective" topographic feature that shielded the foot-slopes from the direct flow of floods, and where flood deposition helped seal the colluvium. This is somewhat similar to Chapman's model used along the Little Tennessee River where constrictions in the river valley provided similar "protection" and deposition. (Chapman 1977: 2). Refinement of the colluvial foot-slope model would require further testing that is beyond the scope of the present investigation.

MAN'S INFLUENCE ON THE RIVERINE GEOMORPHOLOGY

Man has influenced the environment of the Little Platte Valley. For example, many ponds and small lakes have been developed within the valley and on small tributaries to the Little Platte Valley. There is no doubt that some of these ponds and small lakes were built at locations of springs or seeps, and are no longer identifiable.

Chapter II mentions other changes that may have occurred in the Little Platte Valley in historic times. Testimonials from older citizens of the area are cited; they remember times when rock ledges and sand bars occurred in the channel bottom, when hay-racks could be driven beneath Miller's bridge (Figure 3-2a) with a man standing on the top of the hay, and when and where fence-posts were driven that were subsequently buried by deposition during floods. One individual claims that 20 feet of sedimentation has occurred on the flood plain. The overall impression from these recollections is that there has been a tremendous

amount of deposition on the floodplain of the Little Platte River, and features such as the mill dams, bridges, and other man-made items had major impacts on the floodplain, particularly in terms of sedimentation.

This impression of fairly extensive flood plain aggradation seems to contradict the conclusions of the geologic and gemorphic investigation which indicate that the T_1 surface has experienced little net aggradation since early Holocene. However, the contradictions are muted when the specifics of these testimonials are investigated and it becomes apparent that these individuals were referring to localized phenomena.

First, the occurrence of rock ledges, sand and gravel bars, and perhaps another "bottom" probably did occur within the confines of the present channel, and the people who reported these occurrences may have been correct. These features now occur beneath a layer of silt that was derived from the increase in erosion caused by historic agricultural practices. Evidence for increased surface erosion over the past few decades can be seen in the form of recent gully and rill erosion on the valley slopes and uplands. The soils eroded from these areas moved into the valley drainage and caused siltation in the channel.

Commonly, former channel bottom features are exposed during floods when the silt deposits lying on the channel bottom are lifted into suspension. The silt is redeposited as the flood subsides, recovering the channel features (Ritter 1978: 274). However, it should be emphasized that most of the siltation is confined to the present river channel, which this investigation indicates was probably formed subsequent to prehistory.

The fence post that was buried by flood sediments was visited by George Gardner and Mr. "Shorty" Harris, the local citizen who installed the post and observed its burial. The fence post lies within a meander scar of the T_0 surface, and judging from the marshy condition of the location, appeared to be a rather recently formed meander scar. Analysis of aerial photographs shows that a small embankment from a former roadway blocks this meander scar, enhancing the ponding of water and deposition of sediment in the scar. Since natural low areas are subject to rapid sedimentation, Mr. Harris's observation is correct, the fencepost is being buried by flood deposition. However, it is not due to an overall aggradation in the flood basin, merely the natural filling-in of a topographically low area formed by meander cut-off in the T_0 surface.

The Miller Bridge area is also mentioned as an area of extensive sedimentation. What was observed here was the recent siltation of a channel in response to agricultural practices. Hay racks may have been pulled beneath this bridge at one time, however, subsequent siltation of the channel makes such an effort now impossible. Again, the silting is restricted to the channel itself, not the T_0 or T_1 surfaces.

The lack of sediment accumulation on the T_1 and T_0 surfaces is supported by tree-ring counts that were performed on two trees immediately adjacent to the Miller bridge, on the bank of the T_0 surface. Each tree had over 80 rings, indicating that no appreciable sedimentation has occurred at this locality for as much as 80 years.

The occurrence of mill dams and channel constrictions along the Little Platte River are implicated as having major effects on the drainage system. Dams, bridges, and other man-made features have a direct impact on the hydrodynamics of the river and do affect erosion and sedimentation on the river. However, the degree to which these features affected the overall geomorphology of the Little Platte River is believed to be small and generally restricted to the T_0 surface area.

For example, the mill dam at Smithville was indicated as having backed-up water for at least six miles, as far upstream as Miller Bridge on Clay County Highway W (Figure 3-2a). What may be envisioned from this statement is the occurrence of a lake extending from Smithville to Miller Bridge. This would be a misconception. The maximum possible elevation of the top of the mill dam at Smithville is estimated to be about 810 feet (MSL) and the actual elevation was probably closer to 798 feet MSL based on photographs of the dam. If the 810 contour is traced upstream, the impounded area that exceeds the dimensions of the present channel does not extend for more than 2 miles, which does not even reach into the study area above the new Corps of Engineers dam. The backwater would pool within the present 25 meter wide channel and would extend to Miller Bridge, but it would not look much different from the present river at normal water level. The more probable dam elevation of 798 feet MSL would have even a shorter pond length. During floods, the hydrologic influence of the dams would extend somewhat farther upstream; however, the major effects would still be confined mainly to the T_0 surface and present channel, a relatively "minor" area in terms of the overall geomorphology of the valley.

Human activities have impacted the hydrodynamics and sedimentation characteristics of the Little Platte Valley. However, these activities have had little influence on the major geomorphic processes of the valley as these pertain to the location of buried archaeological sites, except where man has directly excavated or buried areas during construction. Neither the T_1 nor the T_0 surface have received much depositional aggradation except in small, topographically low areas (i.e., meander scars).

Most of the major hydrodynamic impact of man's activity has been to the T_0 surface, which post-dates most of prehistory and cannot contain early archaeological sites. The greatest impact on archaeological sites probably was the natural flooding and attendant surface erosion and redeposition on the T_1 terrace.

HISTORICAL GEOMORPHOLOGY OF THE LITTLE PLATTE VALLEY

The pre-Pleistocene drainage patterns were quite different from those observed today. Kansan glaciation greatly modified pre-existing drainage patterns and left extensive deposits of glacial drift throughout the region, forming a till plain. Erosion of the till plain formed the basic patterns for the present day drainage in post-Kansan time, with major downcutting of the till plain probably occurring penecontemporaneously with retreat of the Kansan ice sheet. Little Platte drainage characteristics reflect these events. Glacial drift forms the

"superstructure" beneath valley slopes and uplands and pre-Pleistocene drainage divides and bedrock with varying resistances form nickpoints at somewhat narrower, bedrock walled sections of the valley (Figure 3-2b).

Post-Kansan drainage patterns of the Little Platte drainage system probably remained basically the same since Yarmouthian times, with some possible shrinkage of the watershed due to drainage capture from surrounding drainage systems. The occurrence of large amounts of glacial drift and relative lack of extensive downcutting into bedrock in the Little Platte Valley indicates that river erosion has not been extremely active since the establishment of the Little Platte drainage in middle Pleistocene time. The most conspicuous record of fluvial events since that time are the T_2, T_1, and T_0 terraces (Figures 3-2b and 3-3).

The T_2 terrace is believed to be Illinoian or Sangamon in age based on comparison of similar terraces described elsewhere in the region and on soil profile development. The T_1 terrace is believed to be late Pleistocene in age, since it appears to be related to the Bignell loess. The T_0 terrace is the youngest in the valley and may have formed within the past thousand years, possibly subsequent to prehistory.

Figure 3-15 is a schematic summary of environmental and geomorphic changes from the late Pleistocene to the present. The estimated trend of the climate is shown as a fluctuating line to demonstrate that the short term climatic conditions may have been quite variable. In the late Pleistocene (prior to 10,000 years B. P.), the existing boreal forests become climatically stressed by warming and drying climate, while the last major loess (Bignell) was deposited both on uplands and within the valleys. Prior to and during this time, the pre-T_1 surface and the older terrace deposit beneath the present T_2 surface were veneered with loess. The T_1 terrace was formed by a combination of loessial, colluvial, and alluvial processes. The warming and drying trend accelerated between 11,000 and 9,000 years ago with the predominant spruce forests being replaced by mixed-deciduous and prairie vegetation. Change in vegetal pattern to prairie on the uplands probably caused a substantial increase in erosion of the loess from the uplands and slopes, and attendant colluviation. Colluvial deposits tended to accumulate at foot-slopes and in swales.

Warming and drying continued, peaking between 8,000 and 6,000 years ago. Mixed-deciduous forests waned at the expense of prairie with trees remaining only along valley bottoms. Increased erosion on uplands and upper to mid-valley slopes and colluviation were probably the major geologic processes working during this period, particularly on the uplands and slopes, where only a thin (less than one meter) cover of late Wisconsin loess now remains. The T_1 terrace may not have been in geomorphic equilibrium with prevailing hydrologic and sedimentologic conditions, however, river discharge was sufficiently reduced so that an extensive, new level of flood plain development did not occur at that time. At that time, the Little Platte River was an intermittent, misfit stream.

At about 5,000 years ago, a cooler, moister climatic trend was established with expansion of deciduous forest in the valleys and on valley slopes. This change in vegetation may have helped to temporarily

stabilize the flood plain landforms in the valley until moisture increases were significant enough to overcome the stabilizing effects of the vegetation and begin new flood plain development. Although it is not well documented in the Midwest, the cooler, moister trend may have culminated at about the same time as the "Little Ice Age," which is recorded in Europe between about 550 and 125 years ago. The increased moisture may have provided the impetus for new flood plain development. Thus, downcutting of the T_1 surface and initiation of the T_0 surface may have started during this cooler, moister period. This conclusion is supported by a radiocarbon date of 450 +/- 150 years B.P. (GX-6311) for T_0 meander scar sediments.

The relatively long hiatus between the T_1 and T_0 alluvial events might best be explained by the hypothesis that the Little Platte River was not very active as an eroding river during the drier portions of its Holocene history. The last few centuries probably had the longest sustained period of increased moisture experienced by the drainage since late Pleistocene. Major erosion occurred on the T_1 terrace over the last few centuries as the T_0 surface was formed by scouring and removal of portions of the T_1 terrace.

Finally, recent agricultural practices by Euro-Americans have caused changes in the sedimentologic regime of the river by increasing sheet wash and gully erosion. These processes have increased the sediment load of the Little Platte River and buried channel bottom features such as rock ledges. However, significant thicknesses of sediment have not been deposited on the T_1 or T_0 terraces. Tree ring counts for eight trees situated on these terraces and on the banks of the Little Platte River indicate that they are at least 70 years old. These trees could not tolerate more than several inches of deposition without dying, indicating there has not been a substantial accumulation of sediment on these surfaces during that time.

A MODEL FOR LOCATING AREAS OF DEPOSITION AND EROSION AND LOCALITIES WITH BURIED CULTURAL REMAINS

The reconstruction of the geologic and geomorphic history of the Little Platte Valley produced the following model for loci of erosion, deposition, and buried sites during Archaic and early Woodland times:

1. The <u>uplands</u> have been mainly an area of erosion since late Pleistocene time (about 10,000 years ago) and most archaeological sites should occur near the surface or within the plow zone, and should be easily detected by surface survey. The lack of deposition and sealing could result in a mixed assemblage of artifacts from Paleo-Indian through historic where multiple occupations have occurred.

2. The <u>upper portions of the valley slopes</u> have been subject to erosion throughout the Holocene and could also contain mixed artifactual assemblages. At least some of this material will not be <u>in situ</u>. By contrast, the <u>lower valley slopes and foot-slope areas</u> have been subject to colluvial deposition, especially between the

late Pleistocene, about 10,000 years ago, and the end of the warm-dry period from 5,000 to 3,000 years ago. This is prime terrain for location of sealed, stratified sites. Artifactual material could be largely in situ and mixing of different cultural components should be at a minimum. Colluviation on foot-slopes and colluvial fans emanating from small tributary swales were targeted for deep testing.

3. The T_2 terrace surface (Figure 3-2b) is interpreted as Illinoian or Sangamon in age and is, thus, too old to contain buried cultural material. There is a slight possibility of sites being located beneath the shallow surface from localized deposition.

4. The T_1 terrace surface (Figure 3-2b) has had the same general form through most of the Holocene. Locally, erosion and deposition have removed and redeposited the soils on its surface, disturbing cultural materials and, perhaps, burying some sites. However, most archaeological sites should be in the near surface zone and thus exposed by surface plowing and discoverable by surface survey. A mixed assemblage from Paleo-Indian through Steed-Kisker could be present here. As with the T_2 surface, some shallow burial may have occurred by minor alluviation and colluviation.

5. Low points on the T_1 surface, primarily meander scars that postdate major loess deposition, have undoubtedly been sites of sedimentation since their formation in Holocene time. Schmits (1978) suggests that such localities may have been occupied during the warm dry period of the Altithermal (8,000 to about 4,000 years ago) when the stream beds may have been dry. Subsequent deposition would then seal these areas. Several meander scars were scheduled to test this hypotheses. Natural levees associated with meander scars would also constitute a depositional area with the potential for containing buried archaeological sites. Natural levees, however, are not clearly identifiable within the Little Platte drainage. Examination of air photos and field test pits failed to reveal indisputable levees and it is suspected that little levee type deposition had occurred since late Pleistocene times. Deep testing of several possible natural levee areas was scheduled even though artifactual materials were expected to concentrate near the surface and would be easily detected by surface surveys of plowed areas.

6. The T_0 surface (Figure 3-2b) appears to postdate most prehistoric cultural periods, and it is surely younger than the Archaic and early Woodlands periods which this investigation was designed to concentrate upon. Therefore, further testing of the T_0 surface and deposits is unwarranted.

7. Natural springs have elsewhere been fruitful locations for archaeological and paleontological sites (e.g., Wood 1976: 97-110). Unfortunately most of the larger springs in the Little Platte Valley have been destroyed by extensive pond and small lake construction. Thus, significant undisturbed archaeological sites associated with springs and spring flow are not expected in the Little Platte River valley.

TESTING THE MODEL FOR DETERMINING LOCATIONS OF BURIED SITES

The model for archaeological site distribution was first tested by studying the distribution of surface archaeological sites from Pangborn and Kay (1967), O'Brien (1976), and the GAI surveys, as tabulated on Table 3-4. The topographic subdivisions are those used by O'Brien (1976), namely bluff top (upland), bluff slopes, and valley floor which includes the T_2, T_1 and T_0 terraces. Mapping of all site locations revealed that all of the bluff slope sites were actually located on the foot-slopes of the valley sides.

The distribution of archaeological material in Table 3-4 falls into two sets, with Paleo-Indian through Steed-Kisker sites being located on both bluff tops and valley floors while only Steed-Kisker sites were found on valley slopes. The locational model predicts that the bluff top, or upland terrain, is primarily erosional and a superposition of the entire range of cultural material should occur near the surface. Table 3-4 shows this to be true.

The T_1 and T_2 terraces are depositional but predate occupation of the area. Thus, the model predicted that artifactual material from Paleo-Indian through Steed-Kisker should occur near the surface and be detectable by surface survey. Table 3-4 shows that is the case. The model predicts that the T_0 terrace is too young to contain archaeological material, and as Table 3-4 shows, no sites occur on the T_0 terrace.

The model predicts that colluvial foot-slopes are prime areas for deposition and possible burial of archaeological sites. Table 3-4 shows that colluvial foot-slopes (upon which all bluff slope sites were located) have only Steed-Kisker assemblages on the surface and no surface evidence of older occupations. The absence of Paleo-Indian, Archaic, and ceramic-bearing cultural deposits on foot-slope surface soil may indicate that they are buried.

The final step in this locational analysis was to refine the locational model by deep testing specific locales where archaeological sites might be buried, based on the geomorphology of the valley. The localities where depositional burial of sites might have occurred are:

1. Lower valley slopes and foot-slopes where colluviation may have buried sites. Included within this category are colluvial "cones" emanating from small, ephermeral tributary swales and gullies, and general colluvial soil accumulations on lower slopes;

2. Meander scars in the T_1 terrace and their associated banklines where natural levee deposition could have occurred.

Twenty-five locations falling into one or the other of these categories were identified in the Little Platte Valley by terrain analysis using aerial photographs, and nine of these localities were selected for

deep testing. The details of methodology, site selection methods, and deep testing results are presented in Appendix D-VI and are only summarized here.

Of the nine selected deep testing localities, four are colluvial foot-slopes and five are meander scar and natural levee localities (see Appendix D-VI). No buried cultural material was encountered in the meander scar and natural levee localities, however, two of the four colluvial foot-slope localities produced buried cultural material. At Deep Test Locality III (Figure 3-2a) a hearth composed of fire-burned rocks was uncovered from below the plow zone, ranging in depth from about 0.3 to 0.5 meters. The hearth contained one small grit-tempered pot sherd. At Deep Test Locality IV (Figure 3-2a) a Middle Woodland point (Figure 6-2s; Plate 6-3g) was encountered at about 0.3 meters and lithic debitage was encountered below that to a depth of about 0.7 meters. The finding of two sites out of four tested at colluvial foot-slope localities supports the thesis that locales that experienced colluviation, perhaps combined with some alluviation, are prime locales for buried archaeological sites in the Little Platte Valley.

LOCATION OF SURFACE SITES BY TERRAIN ANALYSIS

Although locating surficial archaeological sites was not part of the scope of work for this investigation, the stereographic air photo analysis provided an excellent opportunity to delineate areas that appeared to have good potential for location of archaeological sites. The geomorphic history and locational model provided the locations of landforms that have not received deposition throughout prehistory and where archaeological materials, if present, should occur near the surface and be easily detected by surface survey. The location of surface loci that might contain archaeological sites was based partly on the known distribution of sites in the region (e.g. Chapman 1975: 67, 71, 75; Johnson n.d.: 5, 6, 13; Martin 1976: 64, 68, 73, 78; O'Brien 1977: 9, 22; Shippee 1964: 24, 38; Shippee 1967: 3, 5, 10), and partly on intuition.

Chapman (1975: 67, 71, 75) reports that early sites are often found on high points overlooking valleys. This belief about the location of older sites was also mentioned by Shippee (personal communication). Therefore, areas of prominent location with "good views" of the valley were delineated, and scheduled for surface survey, particularly those where the river passed close by or may have passed close by as evidenced by meander scars. In addition, areas on the T_1 terrace with similarly prominent positions and/or evidence of close proximity to the river at one time were delineated and scheduled for surface survey.

In all, 50 locales were delineated and scheduled for surface survey based on the landform analysis and the combined intuitive and empirical model for surface site distriubtion. These were localities different from those delineated as potential areas for site burial. Of those 50, cultural materials were found at 31, and 12 contained materials significant enough to merit registration as archaeological sites. Thus, more

than 60 percent of the areas identified as potential archaeological site localities contained cultural materials, and 24 percent were considered significant enough to merit registration. This seems to indicate that a terrain analysis, such as used in this study, is a good tool for aiding in locating archaeological sites. The details of this directed site survey are presented in Chapter IV.

CONCLUSIONS

1. In general, the uplands and T_2 and T_1 terraces of the Little Platte drainage should have all archaeological materials contained within a meter of the ground surface, with greatest concentration in the plowzone. Small, localized areas with potentially buried sites occur on these landforms, particularly the T_1 and T_2 surfaces where flooding produces localized loci of erosion and deposition (Turnbaugh 1978: 593-607). The intense reworking of the T_1 terrace surface by flooding also could have caused considerable disturbance and mixing of cultural materials located on it.

   This investigation concentrated on the larger, more comprehensive aspects of landform/ site burial relationships. An investigation that would include identifying localized loci of deposition on the T_1 terrace would require an extensive field program. The probability of finding significant archaeological sites in such a program is low, since extensive flooding of these surfaces over the long period of time may have destroyed the contextual integrity of any sites. For example, the apparent mixing and disruption at Sites 23 CL 273 and 275 probably were caused by flooding.

2. The colluvial foot-slopes are the most promising loci for buried archaeological sites. Further refinement of the colluvial foot-slope model based on local geomorphology might prove productive in future studies in the region. For example, of four sites tested the two most productive sites were located in positions protected from direct flood flows where minor alluvial deposition helped seal the colluvial deposits.

3. The T_0 terrace is too young to contain prehistoric cultural material in original context.

4. Paleoenvironmental and hydrologic reconstructions indicate the rainfall during the Archaic and, possibly, Early Woodland periods may not have been sufficient to sustain the Little Platte River as a perennial stream, thereby limiting the resources of the valley. The presumed gradual increase in moisture after the Altithermal about 4,000 years B. P. may have increased the resource potential of the valley.

   Thus, the apparent absence of sites from the earlier cultural periods may be a function of the valley not being able to support a significant number of people at that time. The presumed increase in moisture around 4,000 years ago may have caused a gradual

increase in the resource potential of the valley, causing a more prolific occupation. However, further work is required on sites from the Archaic and Early Woodland periods to determine if life-styles reflect environmental conditions that would help verify or deny this hypothesis. Until then, no firm conclusion can be made.

5. Geomorphic modeling and terrain analysis using stereographic aerial photography prior to field surveys can aid in locating shallow archaeological sites.

6. The methodology developed for this study was successful, and is recommended for future studies of prehistoric, man-land relationships in similar environmental situations.

SUMMARY

The investigations discussed in this chapter defined the broader aspects of the geomorphic history of the Little Platte Valley upon which the model for locating potential loci of buried archaeological sites was made. The model also prompted the inference that the sparsity of early archaeological sites may have been caused by an arid to semiarid climatic conditions in the Archaic period, conditions that limited the resources of the valley and human habitation as well. However, the discussion is not complete without putting the interpretations and conclusions in perspective.

We recognize several areas where the potential for refinement, modification, or reinterpretation occur. For example, we recognize that our locational model requires one more step of investigation to test the model. This step would involve deep-testing more colluvial foot-slope localities. More colluvial foot-slopes were not investigated for this study because they were not considered to be an optimum location for significant habitation sites. However, this conclusion for the Little Platte Valley does not preclude the possible location of significant sites on foot-slopes in other valleys, particularly in larger drainages where longer flow durations may have occurred during the more arid Archaic period (e.g., Platte River Valley).

We also recognize several areas where additional data would be helpful. A larger quantity and wider distribution of sediment samples, particularly loess from outside the Little Platte Valley, is required before the upland deposit and other loess related questions can be resolved. Absolute dates from the T_1 terrace would be a great asset for the development of the model of terrace history. A better climatic history is needed for this area. Pollen preservation is poor in this area because of the highly oxidized nature of the sediments, and establishing a pollen profile with which to interpret paleoenvironments is almost impossible. Therefore, other techniques are needed to decipher the climatic changes of the past.

Fortunately, the geomorphic history developed for the Little Platte Valley was not totally dependent on any one aspect of this investigation. Rather, the conclusions presented herein are a result of a synthesis and integration of all the data and observations. For this reason, we believe that the conclusions and interpretations presented in this chapter are the "best fit" model of the geomorphic history and potential loci of buried archaeological sites, based on the present state of knowledge.

CHAPTER IV

THE ARCHAEOLOGICAL FIELD INVESTIGATIONS AND THE SETTINGS OF THE SITES

INTRODUCTION

The Scope of Work for the contract specified that sites 23 CL 208, 225 (loci 1-8), and 226 were to be extensively excavated and sites 23 CL 229 and 232 were to be test excavated only. Site 23 CL 208, a purported Steed-Kisker burial mound, was to be excavated so as to produce data which could be compared with that from 23 CL 108, the Chester Reeves burial mound, previously excavated by O'Brien (1977) and Finnegan (1977). Sites 23 CL 208 and 225 were to be investigated to "refine Steed-Kisker chronology and the settlement-pattern hypothesis presented in the O'Brien report." In the recommendations in her 1977 report, O'Brien (1977: 104-106) identified this settlement pattern as consisting of a family farmstead (CL 225) and cemetery (CL 208). A methodology was to be devised which would allow testing the hypothesis that Site 23 CL 208 was the burial ground for the occupants of the several farmsteads at 23 CL 225 (See GAI Consultants' proposal, Chapter I). The eight loci at 23 CL 225 were reduced to four during field investigations and redesignated 23 CL 273, 274, 275, and 276.

Sites 23 CL 229 and 232, likewise attributed to the late prehistoric Steed-Kisker culture phase, were thought by O'Brien (ibid.) to be located in an anomalous situation near the eastern end of Camp Branch. Because their elevations were between the multi-purpose lake level and the flood level, O'Brien recognized the erosional threat posed to them and recommended testing to evaluate the threat. Lake-edge erosion and vegetation removal near the Smithville Dam led to the discovery of site 23 CL 279, which the COE authorized GAI to test and evaluate. Because this testing was not part of the original contract and did not contribute data pertinent to the research objectives, it is reported separately in Appendix C.

In addition to the above sites, GAI Consultants' field program was to include geomorphological studies designed to "identify terrace sequences in order to define areas likely to have buried sites" and "to determine the previous extent of erosion on surface sites to be investigated." A model combining both archaeological and geomorphological input was to be developed to "predict" the location of buried Archaic and Woodland sites, and such places were to be tested by limited excavations. Because this component of our field investigations is so intimately related with the geological and geomorphological investigations, it is included in Chapter III. However, the directed archaeological site survey, an intermediate phase in the search for buried sites, is covered in this chapter.

This chapter describes the sites investigated and their settings, the field techniques employed, the directed site survey, and problems encountered in the course of the field work. This chapter is the appropriate place to discuss the effect of recent geographical change and the

impact of Euro-American activities on the prehistoric archaeological sites GAI Consultants and previous researchers have investigated in the Little Platte Valley. As a result of this review, some published ideas on Steed-Kisker settlement system components have been challenged (e.g., family-farmstead burial mounds, unifunctional storage sites); a reassessment of this topic receives further attention in Chapter IX. Finally, a brief synopsis of the settings of the investigated sites is presented. The complete discussion of sites 23 CL 276 and 274, loci formerly included under the 23 CL 225 designation, is presented in Chapter VIII.

The locations of the sites discussed in this chapter are shown in Figure 4-1, which also includes previously investigated sites. For each individual site excavated or tested, a map showing the locations of the excavated units, features, and geological test pits is included. Site 23 CL 279, which was found after temporary impoundment of water behind the dam had caused lake-edge erosion, is reported on separately in Appendix C.

SITES INVESTIGATED BY GAI CONSULTANTS

Site 23 CL 208

Patricia O'Brien (1977: 105) suggested that the small mound designated 23 CL 208 might be a Steed-Kisker family cemetery intimately related to the multilocus Site 23 CL 225, half a kilometer to the east. In fact, the scope of work required that this suggested relationship be tested in our investigations, and a rather involved methodology was proposed to perform this test (see GAI's proposal, Chapter I). Mitigation recommendations for this site were that it be "extensively excavated" with a physical anthropologist, specializing in osteology, present during excavations. Dr. Michael Finnegan, Kansas State University, was engaged as this specialist, but his services were never required since the mound proved not to be a burial site.

Patricia Moberly, Corps of Engineers-Kansas City, and McHugh located the site on July 1, 1978, and noted its need for protection from the bulldozers roaming the area and which had already tracked up the margins of the site. Moberly subsequently staked off and flagged the site. When the mound was next located by GAI Consultants in mid August, it was densely covered with weeds, and surface visibility was almost nil.

Site 23 CL 208 lies at the eastern edge of a ridge bordered by a north-south trending ravine which contains an intermittent south-flowing stream, a tributary of the Little Platte River (Figure 4-1). The ravine drops off steeply east of the mound to a depth of 15 to 20 feet below the mound which is at an elevation of about 850 feet M.S.L. The legal description of the mound is the SE 1/4 of the NW 1/4 of the NW 1/4 of Section 18, Range 32 West, Township 53 North. The UTM grid location is zone is, Northing 487,400, Easting 180,000. The mound is located at the eastern terminus of a dirt track, and aerial photographs taken for the Corps of Engineers in 1963 (kindly supplied by Harold Harris), reveal

the disturbed nature of this place, the vegetation cover having been completely removed.

A small barn was located about 50 meters northwest of the mound, and a linear trench, four to five meters deep and eight to ten meters wide, formerly used to store silage, extended southward from the barn and ended about 20 meters west-northwest of the mound. Thus, evidence of considerable alteration of the original ground surface in the immediate vicinity of Site 23 CL 208 exists.

The physical investigation of the mound began on August 28, 1979, with the removal of the dense vegetation cover to permit examination of the ground surface and placement of a grid over the site (Plate 4-1a). Close inspection of the cleared surface, an area of 144 square meters, failed to produce any artifacts. A grid system was laid out over the site by installing a north-south baseline two meters west of the mound, a parallel line one meter east of the mound, and several perpendicular east-west lines across the mound and its margins. The elevations of the grid intersections were taken with a transit to permit constructing a topographic map of the site. An arbitrary datum point had been established at the southern end of the north-south baseline, and all elevations taken were related to this datum. The mound measures nine meters north-south, eight meters east-west, and 1.5 meters high.

We attempted to settle the question of whether the mound was a cemetery as expeditiously as possible. Consequently, we excavated a trench straight to the center of the mound and a series of supplemental 1 m by 1 m test pits on the mound and around its margins. Following removal of the remaining surface vegetation and roots, the one-meter wide trench was begun west of the mound. One-meter square units were employed to record horizontal artifact distribution, and the vertical controls were planned to be 10-cm units initially, but this was abandoned as the nature of the mound fill became apparent. Excavation was accomplished by shovel-slicing and by trowelling. Walls were trowelled flat to help expose any stratification which might be present and to prepare these surfaces for photographs and drawing. Black and white photographs and color transparencies were made using 35 mm cameras. The fill removed was screened through one-fourth inch mesh fabric. In all, 13 squares were excavated, 7 forming the trench excavated from outside the western margin of the mound to its center, 3 individual pits elsewhere on the mound, and 3 pits outside the perimeter of the mound. Figure 4-2 shows the site topography and the location of the trench and test pits. The trench was excavated to 10 cm below the original surface on which the mound was created; outside the limits of the mound, the meter square test pits were dug 20 to 40 cm below the surface.

No prehistoric artifactual remains were recovered in the mound fill, and no skeletal remains were encountered (Plate 4-1b). Only historic artifacts were recovered: fragments of barbed wire, glass, crockery, metal nails, a large bolt, and a metal buckle (See Table 4-1 for a complete inventory.). We conclude therefore, that the mound is of historic age but hardly historic in significance, and very likely the by-product of earth moving activities which were well manifested in the vicinity of the mound. George Gardner, Project Geologist, insists, however, that the mound fill did not come simply from the material

excavated to form the silo trench. More likely, the mound was an accumulation of scrapings from the surface when the track was made or modified. Only weeds and brushy plants existed on the mound surface; no trees had taken root.

The investigations at 23 CL 208, although without any positive scientific results, were not without some benefits. First, O'Brien's hypothesis that the mound was the burial ground of the occupants of the 23 CL 225 complex was disproven. Second, the site provided an excellent training situation for the newly recruited members of our excavation team, local citizens without previous archaeological field experience.

Sites 23 CL 273, 274, 275, and 276

The complex of prehistoric settlement loci originally designated 23 CL 225 had been reduced in number, and the four where we found prehistoric cultural remains, each of which we extensively excavated, have been given new site designations by the Missouri Archaeological Survey. The reasons for the redesignation become apparent in the following narrative describing the conditions and preliminary field investigations in this locale.

These four sites are located on a kilometer-long stretch of floodplain and adjacent terraces west of the Little Platte River and south of State Road W, about 3.5-4.5 km (2-3 miles) due northeast of Smithville (See Figure 4-1.). In this same stretch, O'Brien's site survey crews found prehistoric cultural evidence on the surface at eight spatially separated spots, two on the elevated terrace at the north end of the locale and six on the floodplain in the central and southern parts of the locale. We believe that we have successfully relocated three of the loci discovered in O'Brien's surveys, those designated No. 1, No. 7, and No. 4 on the original site survey form filed with the Missouri Archaeological Survey. An explanation of our failure to locate and investigate all the postulated loci is in order.

First, the only map showing the locations of the eight cultural loci was one appended to the site survey form, a simple sketch map without any topographic features at a scale of about 1:8000. An accumulation of recently deposited alluvium, caused by temporary impoundment of water by the dam, covered the floodplain; flood-deposited debris was also widespread. The third contributing factor was the dense growth of vegetation covering the entire locale when we commenced field investigations. This dense cover necessitated the use of earth-moving machinery in clearing selected areas of the roughly 80-acre locale. First, a local farmer was employed to reduce the vegetation over about 60 acres with a tractor-pulled disc; this step merely chopped up the weeds and ground them into the earth. While visibility of the ground surface was not improved, we could at least see where we were driving and the gentle topographic differences on the floodplain.

This latter fact and the sketch map with the site loci guided the selection of areas chosen for clearance by a motor-scraper (Caterpillar 627B). Starting at the southern end of the floodplain, 15 places of different size were completely stripped of surface vegetation, flood

debris, and topsoil, sometimes to a depth of about one meter but generally less (ca. 30 to 40 cm). Scraping was stopped when cultural remains or soil anomalies were encountered. The distribution and extent of the machine-cleared area is shown in Figure 4-3 and Plate 4-2. We estimate the area so cleared amounts to 46,200 square meters, or about 11.4 acres, almost 14 percent of the total acreage of the locale.

The very first place selected for machine scraping, a low rise in the southern end of the CL 225 complex area, produced prehistoric cultural remains (baked daub, potsherds, some lithic material). This spot probably equates with O'Brien's locus No. 1 and is now designated 23 CL 273. Subsequent testing on the floodplain proved less rewarding, and in only one other place, in the east central area, were cultural remains discovered which warranted extensive testing. Now designated 23 CL 275, it probably equates with O'Brien's locus No. 7. After testing 15 places on the floodplain, we moved the scraping operation to the ridge in the northern part of the locale. The southern knoll was criss-crossed by the scraper, but no concentrations of prehistoric artifacts were found. This is the place where O'Brien's locus No. 3 was located. The scraping was extended to the north, resulting in the discovery of two prehistoric sites; 23 CL 276 (O'Brien's locus No. 4) and 23 CL 274, not previously reported. Most of the top of the ridge was scraped free of vegetation and topsoil to a depth of approximately 15 to 20 cm (6 to 8 inches) below the surface prepared by removal of the vegetation.

After removing the surface vegetation from a broad area, the motor-scraper made two to four or five passes, removing 5 to 8 cm of soil in each strip before moving to the adjacent strip. The removed dirt was dumped well beyond one end or the other of the area being stripped. The freshly exposed surface behind the motor-scraper was immediately inspected by crew members, and places producing cultural remains or suspicious stains were quickly staked and tagged.

As indicated, the use of the motor-scraper enabled us to locate four prehistoric sites in the locale where O'Brien's crew had found eight. We recognized the need to precisely plot the positions of the sites that we intended to excavate on a topographic map. To that end, GAI archaeologists established a north-south baseline across the locale, from which several perpendicular lines were established to tie in all the loci with prehistoric artifactual remains and to serve as baselines for constructing grids over these sites. Eventually, the north-south baseline was tied to the U. S. Coast and Geodetic benchmark located on the Miller Bridge, and the elevations of the several datum points likewise were tied to the benchmark elevation.

Our initial activities at the 23 CL 273, 274, 275, and 276 complex were conducted in early September 1978, concurrent with the excavations at the nonburial mound, 23 CL 208. Work continued at 23 CL 276 until October 25, when we moved our investigations to 23 CL 226, about one kilometer north.

The Locale of Sites 23 CL 273, 274, 275, and 276

The locale stretches about 1100 m north to south and 300 m east to west immediately west of the Little Platte River and south of State

Route W, which crosses the river over the Miller Bridge (See Figure 4-3). The highest elevations, 841 to 843.5 feet MSL, are on a NNE/SSW-trending ridge in the northern part of the locale; sites 23 CL 274 and 276 are located on this ridge. A ravine with an intermittent stream borders the ridge on the northwest and north, and joins the Little Platte just south of the bridge. The river, which forms the eastern and southern boundary of the area investigated by GAI Consultants, flows at slack water below 810 feet MSL, its channel sharply incised in the floodplain. The floodplain lies between about 810 feet and 830 feet MSL; it increases in width to the south, reaching about 0.8 km at the southern end of the locale. Sites 23 CL 273 and 275 lie at about 820 to 822 feet MSL on ground that is topographically rather level in the southern and east central parts of the locale.

The land surface west of the sites rises gently to 900 feet MSL within 0.6 km (0.4 miles) of 23 CL 276, and to 960 feet MSL 1.8 km (1.1 mile) farther west. East of the Little Platte River, the floodplain is narrower (0.1 to 0.3 km wide), and the ground climbs more steeply to 900 foot MSL, 0.5 km east of the river. Camp Branch, which empties into the Little Platte at the southeast corner of the locale, flows west across a floodplain averaging perhaps 0.3 to 0.4 km for the 2 km above its junction with the Little Platte.

Two previously excavated sites are located in the immediate vicinity of the locale of 23 CL 273, 274, 275, and 276. Site 23 CL 113, the Friend and Foe site (Riley 1967; Calabrese 1969), is located about 0.5 km southwest (downstream) of 23 CL 273. Site 23 CL 119 (Calabrese 1974) is located on both sides of State Route W, 150 m (500 feet) east of the Little Platte River, at about 820 feet MSL and about 260 m (850 feet) northeast of 23 CL 274.

Site 23 CL 226

Because of a reported Late Woodland component at Site 23 CL 226, it was selected for intensive excavation. Located about one kilometer (0.6 mile) northeast of the Miller Bridge, it occupies the western end of a spur between 840 to 850 feet MSL. The 900-foot contour is about 0.5 km east of the site. The sloping spur is defined by a well developed ravine on its north and a smaller one on its south, with an intermittent stream flowing through the former. The site is about 150 m east of the present course of the Little Platte and overlooks a somewhat enlarged area of floodplain, as the river turns from an easterly to a southerly course by which it successively passes 23 CL 274, 276, 275, and 273.

As with the previously described sites, 23 CL 226 was overgrown with weeds when first examined. A bulldozer track cut across the site and because of clearing activities, Pat Moberly staked and flagged the site perimeter. Before beginning our formal investigations, the Corps of Engineers Operations Office at Smithville Lake kindly bush-hogged the site, reducing but not completely removing the surface cover. Nevertheless, both abundant historic and some prehistoric artifacts were visible on the surface in limited exposures among the weed stems. A stone-lined well capped by a concrete slab was a conspicuous feature of

the site. A residential building had formerly stood due east on the other side of a dirt road.

Given the scarcity of prehistoric remains on the surface, we decided to remove the remaining vegetation and plowzone from a large area in hopes of exposing undisturbed prehistoric deposits and features. A front-loader was employed to remove the plowzone in parallel strips across the site, and the newly exposed surface was immediately examined for artifactual remains and features, with two of the latter being detected and staked. Scattered artifacts were found on the new surface, mostly historic and mainly on the higher parts of the site near the well.

A grid system was established over the site, and a series of test pits was excavated well into the sterile, clayey subsoil (Figure 4-6). Disappointingly, little was recovered, but two prehistoric features, one containing abundant shell-tempered pottery (F.201) and the second (F.203) with predominantly grit-tempered sherds, were found and excavated. The pottery from these features is discussed in Chapter V, the lithic artifacts in Chapter VI, and the ecofactual (botanical and zoological) remains in Chapter VII.

To recapitulate, within a distance of 2.5 km (1.5 miles) along the Little Platte River in the lower part of the Smithville Lake Reservoir, six prehistoric sites have been extensively investigated by three different research groups. These sites are located either on the floodplain at about 820 feet MSL, or on a hillslope or terrace at about 840 feet MSL or higher. All have Steed-Kisker cultural remains and earlier materials as well. Four other sites are also reported for the same stretch (23 CL 106, undetermined prehistoric; 23 CL 120, historic; 23 CL 271 and 278, undetermined prehistoric), but none of them have been tested. Two of the sites in this stretch have figured in formulations of Steed-Kisker cultural history and settlement systems by F. A. Calabrese (1969) and P. J. O'Brien (1977, 1978), respectively. Thus, the new discoveries at 23 CL 226 and 273-276 take on added importance since they also contain Steed-Kisker artifactual and structural remains and are located between the sites investigated by Calabrese and O'Brien. Because of the unusual nature of their contents, Sites 23 CL 274 and 276 are described in detail in a separate chapter.

<u>Sites 23 CL 229, 231, and 232 on Camp Branch</u>

Three sites near Arley, Missouri, 7 miles (12 km) east of Smithville, were recorded by the Kansas State University survey crews. These sites, 23 CL 229, 231, and 232, were provisionally identified as Steed-Kisker sites by O'Brien (1977), who considered their location near the end of Camp Branch to be anomalous, that is, out of keeping with the concentration of Steed-Kisker sites along the Little Platte River. For this reason and because they were located at elevations above or within the zone of lake-level fluctuations, O'Brien recommended these sites for testing. Specifically, the Scope of Work required test excavation of Sites 23 CL 229 and 232 to:

1. determine the extent and other factors which may determine further work needed if the sites are likely to be affected by erosion; and

2. their placement in the Steed-Kisker settlement pattern.

Sites 23 CL 229 and 232 are located within 0.3 km of each other on opposite sides of Camp Branch, a tributary of the Little Platte River, about 2 km northwest of Arley. Site 23 CL 229's legal description is the NW 1/4 of the SW 1/4 of the SE 1/4, Section 11, Range 32 W, Township 53N; Site 23 CL 232's legal description is the SE 1/4 of the NW 1/4 of the SE 1/4 of Section 11. Both are located in northeast Platte Township in Clay County, with the locale of the two sites centering on latitude 39° 24' 45" North, longitude 94° 27' 32" West. The topography and drainage pattern of the locale is displayed in Figure 4-7.

The locale is one of moderate relief. Camp Branch flows east to west across a narrow floodplain and is relatively deeply entrenched below the 850 feet MSL contour. The slack water of this intermittent stream is approximately 10 to 12 feet below the surface. The bank profile varies between steep to moderately sloping. Bare, nearly vertical banks with undercut trees and exposed tree roots, and rounded banks covered with grass, bushes, and trees are both commonly present.

The partially filled-in segments of three abandoned channels are present on the floodplain below 23 CL 229, and low but clearly discernible levees are adjacent to the abandoned and present-day channels (Figure 4-7). Geological tests were made in two of the abandoned channels, and archaeological tests were conducted on the levees in search of buried sites.

Site 23 CL 229 is located on a narrow, northward sloping ridge (elevation 860 to 880 feet MSL) whose northern boundary is a steep bluff above a bend in Camp Branch Creek some 35 to 40 feet below. The eastern edge of this ridge is also a steep slope bounded by an abandoned channel of Camp Branch Creek, one of three such fossil streambeds in the vicinity. To the west of Site CL 229 is another deeply entrenched stream, Holtzclaw Creek, which drains from south to north and joins Camp Branch about 0.5 km northwest of CL 229 and 0.5 km west-northwest of CL 232. A number of smaller, intermittent creeks join Camp Branch near these two sites, and even these small tributaries flow through deeply incised channels.

Site 23 CL 229 is described on the site survey form as occupying 7,500 square meters between 860 and 880 feet MSL. When we first tried to locate the cultural loci, the site was covered by thick grassy vegetation which, by early fall, included a cover of waist- to chest-high weeds. Visibility of the ground surface was nil. Because surface conditions precluded easy location of areas with artifact concentrations, we undertook an extensive program of subsurface testing in hopes of locating significant cultural loci. Our testing, the extent of which is indicated in Figure 4-8, was accomplished by using both manually excavated test pits, placed by using a partial grid-system constructed on the site, and by employing a tractor-mounted blade to remove the vegetation and topsoil/plowzone in selected areas. Results of both approaches were uniformly disappointing; very little prehistoric cultural material was found, and all of that was in the plowzone. Based on these findings, we concluded that finding undisturbed cultural remains within the large area that we had tested would be unlikely, and we

decided to put in a few test pits within the trees along the edge of the bluff which marked the eastern and northern borders of the site locale. This tactic proved successful, and prehistoric cultural remains were recovered in several squares down to a depth of a little more than 0.5 meters.

These apparently in situ artifactual remains are located along a narrow strip at the edge of the bluff top; the bluff drops steeply about 40 feet to the abandoned channel at its base. The edge of the bluff lies at about 875 feet to 880 feet MSL, that is, 10 to 15 feet above the planned multipurpose pool level of 864.2 feet. Assuming fluctuating lake levels and normal wave action at the contact of the lake surface and the bluff-face, the remaining in situ portion of Site 23 CL 229 will undoubtedly suffer the results of lake-edge erosion when the reservoir is filled to the multipurpose stage and when higher flood levels are reached. (The question of what further mitigation activities are needed at 23 CL 229 still remains to be considered. The problem was outlined in GAI Consultants' interim report submitted in January 1979, see Appendix B). Following inundation of the Smithville Lake Reservcir, the site will be located on a promontory extending northwards into the lake and exposed to wave action on the east, north, and west. The long-term prospects for the site and its remaining cultural deposits do not seem encouraging.

The situation is not so threatening at Site 23 CL 232 for a number of reasons. With considerable expenditure of time and resources, we attempted to locate the loci of cultural remains at this site. A tedious program of shovel testing was initiated in the area indicated for the site location on the Kansas State University site survey form. On September 12 and 13, 1978, over 60 test pits (ca. 0.5 m square, 0.25 to 0.5 m deep) and 30 auger holes were inserted, but only a few historic artifacts were recovered. On September 25, a second series of 40 test pits were dug by backhoe and monitored for prehistoric remains, but again, none were found in these pits. A single flake was found on the surface, and seven backhoe test pits were excavated to depths of 4 to 5 feet in the immediate vicinity, which resulted in only one more flake.

Having failed to discover the site locus, help was sought from the previous investigators. Brian O'Neill, leader of the KSU survey crew that recorded the site, kindly drove from Manhattan, Kansas, to attempt to relocate sites 23 CL 231 and 232 on September 25. O'Neill relocated both sites, and a few flakes were found at both places which proved to be in the immediate vicinity of the area that we had been testing with negative results. On October 9 and 10, efforts were again made to locate the locus of 23 CL 232 by intensively scrutinizing the ground surface between the clumps of grass, and then by removing the sod where artifacts had been located. Ten shovel tests were inserted with scant success. Only a few flakes, a point fragment, and a scraper were found in examining the ground surface.

A final attempt to locate subsurface cultural remains at 23 CL 232 was made by employing a tractor-mounted blade to scrape several swathes across the site; this effort resulted in the discovery of a small concentration of chert cores but nothing else. In short, in spite of much effort and time expended, we failed to find significant prehistoric

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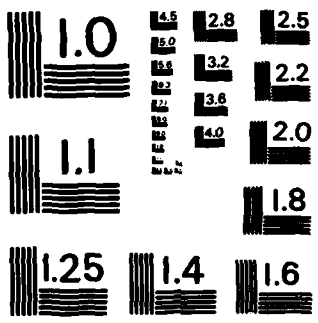
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cultural remains at 23 CL 232. We conclude that what remains of the prehistoric occupation are now widely dispersed, in the plow zone, in the alluvium which covers the lower parts of the area, and on the surface. In our opinion, there is nothing requiring further mitigation at Site 23 CL 232. In anticipation of possible objections to the amount of time and effort we devoted to the search for 23 CL 232, we point out that the site was identified in the Scope of Work as one which would be tested for very specific reasons. We tested the designated site area extensively without finding significant cultural remains and thereby fulfilled the requirements of the Scope of Work. We feel justified in having made the effort that we did to locate the site but, of course, would have preferred to utilize our resources in more rewarding endeavors. One such endeavor was the directed site survey to which we now turn.

DIRECTED ARCHAEOLOGICAL SITE SURVEY

Introduction and Methodology

A traditional survey of the Smithville Lake Reservoir for archaeological sites was not part of the GAI Consultants' mitigation program. The need to conduct a directed archaeological site survey developed, however, as the result of revision of the subsurface testing program, the component designed to locate buried Archaic and Early Woodland sites. Sites of these cultural periods seem to be underrepresented in the valley and are certainly inadequately investigated. Two factors led to instituting the surface survey:

1. The relatively shallow depth of the water table of the floodplain forced us to abandon extensive deep testing in this zone; and

2. The apparent lack of appropriate locales on the elevated terraces and adjacent slopes and uplands where buried sites might be located.

It was in the geomorphological investigations conducted by George Gardner, Project Geologist, that these conditions became evident. Given these constraints on the subsurface testing program, alternative courses of investigation were considered and discussed, and a program of examining the ground surface of selected areas along the river valley was instigated.

In general, the methodology employed in selecting specific areas for surface survey involved ideas on prehistoric settlement patterns and river valley geomorphology, ideas stemming both from our present archaeological and geomorphological investigations and from our earlier researches elsewhere. Having already excluded the low floodplain from serious consideration (high water table; floodplain aggradation and development in post-Archaic times), other locales with potential Archaic and Early Woodland sites needed to be identified. These locales would have had to be situations already in existence in Archaic and Early Woodland times, situations attractive to human settlement, and ones which are preserved and identifiable at the present time.

Although we had been in the field for several weeks when it became apparent that our deep testing program was in need of modification, our familiarity with the Little Platte Valley geomorphology and archaeology was still limited. The geomorphological investigations under Gardner had certainly been more widely scattered than the archaeological investigations, restricted as these were to a few sites. Gardner's initial efforts were not directed toward locating buried sites, but rather, were part of a program designed to determine the evolution of the terrace sequence in the valley. We felt that when the terrace sequence and broad outlines of the valley's geomorphic history were understood, we could initiate a systematic search for buried sites. As pointed out above, however, Gardner's early investigations revealed conditions inimical to the discovery of buried sites on the floodplain and the elevated land surfaces.

We employed three approaches in attempting to identify locales which might have preserved observable manifestations of Archaic and Early Woodland cultural remains:

1. Field reconnaissance;

2. Examination of aerial photographs; and

3. Examination of topographic maps.

In his investigations and field reconnaissance, Gardner had already located some paleogeomorphic features, some of which he tested by backhoe trenching. Similar features were sought through additional field reconnaissance which was guided by our study of the aerial photographs and topographic maps. Some fossil stream channels are hinted at on the USGS 7.5-minute series quads (1:24,000 scale; 10-foot contour intervals). The 1:6,000 scale Corps of Engineers map was more useful, although it also had only a 10-foot contour interval; several fossil channels were tentatively identified on this map and later verified by field examination. Field reconnaissance in the vicinity of Sites 23 CL 232 and 229 led to the discovery of three fossil stream segments on the floodplain, two of which were subsequently tested by Gardner. McHugh had the levee associated with one and a nearby elevated knoll tested for subsurface cultural remains with success in both cases.

Gardner undertook a comprehensive examination of the stereo-aerial photographs of the reservoir in order to locate additional fossil stream channels and old terrace remnants. This activity was by far the most important in the selection of the locales for the directed site survey. The stereophotographic coverage is presently limited to the lower half of the Smithville Lake Reservoir, north to approximately State Route D in southern Clinton County. Most of this area had been recently cleared of arboreal vegetation, a mixed blessing, of course, as bulldozer tracks testified to the tearing up of the ground surface. Because we were able to undertake the pedestrian survey only after we had completed the contractually required site excavation and testing, it was not until late November 1978 that the directed site survey could begin.

Techniques, Conditions, and Personnel

This survey program was conducted from November 22 to December 5, 1978, before the early winter weather prevented carrying out the survey. The weather during the survey was cold, often below freezing, with a few rainy days, resulting in alternately muddy or frozen surfaces in the tracts surveyed and surface conditions which sometimes changed within the course of a day. Marc Collier, Assistant Field Director, directed the survey. The crew was composed of Field Assistants Gene Jenkins, Lee Rasmussen, Ruth Myers, Dennis Falkenburg, and Jim Christensen. In some areas, assistance was given by McHugh and George Gardner, Staff Geologist.

The following procedures were used on this survey. After arrival at an area to be surveyed, crew members formed a line with intervals of 5 to 25 m between individuals, depending on the number of crew members present and situations encountered (e.g., size of area, surface conditions, density of vegetation cover, etc.). Crew members slowly walked across the area, examining the surface of the ground and noting any artifacts. If an artifact was observed by a crew member, a loud report was made to the others that artifacts were present. At these times, efforts were made to locate concentrations of artifacts in the area by drawing the crew members closer together. If a concentration or scatter of artifacts was found, a sample of the artifacts was recovered, and the periphery of the artifact distribution was defined. When no more artifacts were observed, the survey party resumed the initial intervals and proceeded with its survey of the tract. Large tracts required several passes to cover the entire area, each pass being offset from the pre vious one. Tracts varied in area from about one to 20 acres (5,000 square meters to 80,000 square meters). Maps (scale: 1" = 500 feet; 10-foot contours) of the areas surveyed were used in the field in order to plot the locations of artifacts recovered. Notes were made about weather, vegetation cover, surface conditions, crew members present, intervals maintained and time spent in surveying the tracts.

The area surveyed totals approximately 284 acres (1,150,000 square meters), and the collective area of the loci with artifactual remains, determined by the artifact scatter, amounts to about 35 acres. Thirty-one artifact-producing loci were found, examined, collected, and systematically designated with provisional terms (e.g., 23 CL AA, 23 CI ZZ). Site survey forms with pertinent information recorded were completed for the entire 31 loci with artifactual remains. Twelve loci which produced a substantial number of artifacts and/or diagnostic artifacts have received formal site designations from the Missouri Archaeological Survey. The directed archaeological site survey was successful in locating localities with artifactual remains for a number of reasons:

1. Much of the ground surface of the area surveyed had recently been disturbed and partly cleared of vegetation by the clearing operations conducted in the reservoir;

2. Use of relatively experienced individuals, each of whom had two months of training on our crews and was familiar with the types of artifacts being sought;

3. The areas selected for examination had been deliberately selected on geochronological considerations and consisted of landforms likely to have existed in early Holocene times; and

4. The total area surveyed was not very great, and the manpower devoted to the task was more than adequate.

The results of the directed (and areally limited) archaeological site survey conducted by GAI Consultants demonstrates that:

1. Landforms selected on geochronological considerations have a relatively high potential for producing prehistoric sites;

2. Careful scrutiny of newly cleared areas and disturbed surfaces will likely produce previously unrecorded sites; and

3. Archaeological site surveys should be conducted <u>after</u> vegetation clearing operations have been completed.

These conclusions are incorporated in the section on recommendations for cultural resource management in Chapter IX.

SOME EFFECTS OF EURO-AMERICAN ACTIVITIES AND GEOMORPHIC PROCESSES ON INVESTIGATED SITES

General

Discussion of the effects of recent activities and processes on the prehistoric sites in the Smithville Lake Reservoir, which represents the first formal treatment of this topic, is presented as a beginning rather than a definitive statement of activities and processes affecting our understanding of the nature of prehistoric sites. This section fulfills, along with the discussion in Chapters II and V, the intent of the Scope of Work requirements "to determine the previous extent of erosion on surface sites to be investigated." In the broader sense, erosion might be considered as all of those events, processes, and activities which have led to the alteration of the "pristine" condition of the loci of prehistoric aboriginal activity. Because we know of no comprehensive methodology previously employed to appraise the post-occupational history of a prehistoric site, we have formulated our own approach which, while neither elaborated nor sophisticated, serves the purposes of our investigations.

Research on this topic is directly related to problems that we had in understanding the nature of some of the sites we investigated, especially 23 CL 273 and 275. We have assembled information through informal discussions with local residents and collectors, through our own observations in the field, by examining collections of artifacts from the area in question, and by reviewing the earlier archaeological publications for the Smithville Lake area. Since sites investigated by O'Brien (1977) and Calabrese (1969, 1974) often occupy settings similar to the sites that we excavated, we naturally include them in this discussion. As one might expect, the quality of the data assembled for

this discussion is variable. Integrating the information inherent in private collections with that gained through excavations is a tenuous undertaking at best. Combining folk knowledge with data obtained from carefully conducted geological and archaeological excavations is likewise not without its problems.

It should be pointed out that this section represents, in part, a continuation of the subject of recent geographic change in Chapter II. Clearly, recent agricultural activities have severely affected some sites but have had less impact on others. Alluviation and erosion are agents that have also affected the investigated sites. We suggest how the sites we studied have been affected and, in so doing, contribute to our understanding of their composition, i.e., the nature of the distribution and condition of the cultural remains of these sites. If this section explains the conditions at the sites we have investigated, this approach will have served its purpose. If our deductions prove to be applicable to previously investigated sites, so much the better.

We first briefly consider the apparent discrepancy in artifactual remains between collections made by local farmers and land owners, and in the scientific excavations and surveys. Following this discussion is a survey of the sites investigated by GAI Consultants and those previously investigated by O'Brien and Calabrese. A detailed treatment of Sites 23 CL 274 and 276 is postponed until Chapter VIII, where these unusual sites are fully described.

Collector-Informants

We have been fortunate in our work at Smithville to have met a number of truly generous and informative individuals who have contributed considerably to our knowledge of the area and who have made artifact collections available for our study. These individuals are formally acknowledged elsewhere. Local collections of artifacts are often an invaluable source of information on the full range of prehistoric artifacts present in a given area. Certainly, such collections, even though made in unsystematic ways, often contain artifact types never recovered in scientific excavations or surveys. Two facts probably account for this situation:

1. Local collections are sometimes the product of many decades of effort by individuals who are intimately familiar with the landscape because they derived their living from it; and

2. The prehistoric aboriginal sites were in less disturbed condition five to ten decades ago when our informants or their elders worked the land and began collecting Indian relics.

A longtime collector and student of archaeology, Harold "Shorty" Harris, now of Edgerton and formerly of Smithville, has aided all the professionals working at Smithville and has our everlasting gratitude. His collections, carefully recorded as to location and some of it, already in the hands of P. J. O'Brien at Kansas State University, were made available for our study. Harris's systematic efforts over 40 years have resulted in his amassing a large series of projectile points and

other artifact categories. Many of the point types in Harris's collection were not recovered in our excavations, although some were recorded in our site surveys. The ground-and-pecked stone implements that he has collected are entirely alien to the remains recovered in our excavations, although our surveys found a few such specimens.

It is hardly surprising that a collection made over four decades from a large area of the Platte River drainage differs qualitatively from one resulting from a few months excavation at a restricted range of sites in a highly localized area. Nevertheless, the diversity of artifactual materials in the collections of Harris and others is not fully reflected in the collections recovered by scientifically conducted surveys and excavations. Private collections made within the Smithville Lake Reservoir and from the same fields that we investigated provide another example of this disparity.

Frank and Charlie Miller have shown us stone implements that they collected over 70 years ago along the Little Platte. In cultivating the floodplain soils with ox-drawn plows, they turned over artifacts (groundstone axes, chipped stone tools, ceramics, baked daub) buried in the ground. Among the prehistoric implements that they have loaned to us are several pecked-and-ground stone axes of four types (3/4 grooved; flat, thin; small and large celt-like forms). Although our sites were located in the same area in which the Miller brothers farmed and collected, none of these types were recovered in our excavations, and few have been found by other excavators. For instance, only two celts and one possible fragment was recovered from 23 CL 113 and none from 23 CL 118 (Calabrese 1969: 133 and 188, Table 27).

Patricia O'Brien (1977: 203-207, 220; Figure 12) discusses and illustrates artifactual remains recovered from 23 CL 195, a multicomponent site located about one mile east of the Little Platte along Camp Branch. The landowner of the site, Eugene Arthur, collected a number of ground and polished celts from the site, whereas O'Brien's surface collecting and excavation produced only one small poll fragment of a diorite celt.

Admittedly, there is nothing revolutionary in these observations, as the biases that exist between older and more recent collections of artifacts from the same areas or sites have long been recognized. Nevertheless, the lesson drawn from these observations is germane to the discussion presented here. Not only have prehistoric settlement and activity loci in the Little Platte valley been plowed for generations, but they have also suffered the loss of certain classes of artifacts, as cultivator-collectors gleaned selected specimens from the fields. What is then left for the professional archaeologist are often (if not always) disturbed and depleted assemblages which are no longer fully representative of those left by the prehistoric aborigines.

Sites Investigated by GAI Consultants

As indicated earlier in this chapter, we have investigated by limited or extensive excavations six sites in the area under consideration: 23 CL 208, 226, 273, 274, 275, and 276. The six sites are

all located within 2 km (1.2 miles) of each other, about 5 km (3 miles) northeast of Smithville (Figure 2-1), in the lower part of the Smithville Lake Reservoir. The complex of sites, 23 CL 273-276, occupies a kilometer-long stretch of land west of the Little Platte River, south of State Route W. A major tributary of the Little Platte, Camp Branch (creek), empties into the former opposite the southern part of the site complex. Site 23 CL 226 is 1.0 km north on the opposite side of the river.

After having worked at Sites 23 CL 273 and 275 for a week, a heavy rain (September 17 and 18, 1978) in the valley resulted in a temporary impounding of water behind the Smithville Dam which flooded these sites and interrupted our work there. This event provided a first-hand opportunity of seeing the floodplain and the roadbed of the Miller Bridge under water. Of course, there was no surging current flowing by the sites, but simply a small lake created overnight. Brush was left at the edges of this small lake on the floodplain, and a black silt was deposited over everything beneath water level (See Plate 4-3a showing Site 23 CL 275 after the flood.). The upper limit of this silt was at an elevation of about 827 to 828 feet MSL around the ridge on which sites 23 CL 276 and 274 are located. As mentioned, this impoundment was caused by the present Smithville Dam which has been in existence for only a few years and obviously has not influenced flooding, deposition, and erosion before then.

Nevertheless, we know that pre-dam floods of comparable magnitude have taken place long before the dam was constructed. For instance, the 1965 flood rose to 12 feet above sidewalk level in downtown Smithville, or to about 820 feet MSL, where the Little Platte flows below 800 feet MSL. At the Miller Bridge, five miles upstream from Smithville, the river flows at about 810 feet MSL (measurement made September 14, 1979), and a flood comparable to the 1965 flood at this point would have risen to about 830 feet MSL. In fact, according to Harold Harris (personal communication), the earlier 1947 flood covered the bed of the Miller Bridge above a man's height; if we add six feet to the elevation of the bridge bed, an estimated 827 to 828 feet MSL is obtained for this flood at the bridge. At these levels, the road-approaches to the bridge would have been under water over a length of about one-half kilometer (1,600 feet); sites 23 CL 274 and 276 at about 841 feet MSL would have been well above but almost surrounded by water.

Conversely, sites 23 CL 273 and 275 at about 822 feet and 824 feet MSL would have been under about 3 to 5 feet of water (using the 1966 surface elevations from Corps of Engineers Map RP-3-10). Harold Harris's First Bottoms, a half-kilometer southwest of 23 CL 273, would have been under about 18 feet of water, and site 23 CL 113 (the Friend and Foe site), located on Harris's farm, would have been under about 7 feet of water, or perhaps a little less given the valley gradient. Sites 23 CL 273 and 275, located on the Second Bottoms (the T_1 terrace in Gardner's terminology), have been subjected to recurrent flooding over a long period of time, with the frequency apparently increasing in recent decades. Sites 23 CL 113 and 23 CL 119 are situated close to the same elevation and would have experienced the same frequency of flooding as 23 CL 273 and 275.

It would appear, on the basis of our information, that archaeological sites in the lower part of the Smithville Lake Reservoir which are situated below about 825 feet MSL or a little higher have been subjected to recurrent innundations in the past few decades. Over the same period, according to Gardner, sediments in the lower basin have been "moved around," and low places have been "filled in"; that is, alluvium has been deposited widely but unevenly across the floodplain. The total impact of flooding, sediment removal and deposition, temporary saturation, etc., on the archaeological sites on the floodplain cannot, of course, be determined. By comparison of sites in this zone, however, we can characterize the differences in their internal compositions and offer some ideas as to the causes of these differences.

Sites 23 CL 273 and 275, which were scraped clear of surface vegetation and topsoil to facilitate their discovery, were marked by the presence of varying amounts of burned earth fragments (some of which was daub with plant impressions), and some lithic debitage and implements. Pottery was present at 23 CL 275, but not at 273. Before flooding interrupted excavations, four two-meter squares were excavated at 23 CL 273 to a depth of 17 cm below the artificial surface that we had created. Although this surface exhibited a fair amount of burned earth over a thirty square meter area, the test excavations produced only scarce remains (274 gms of burned earth, 3 bifacial thinning flakes, a utilized flake, and a piece of string) and no evidence of structures, pits, or postmolds. Although the excavations reached only 17 cm below the artificial surface, there seemed to be no reason to excavate deeper given the impoverished, abraded contents already recovered from the 16 square meters excavated and the presence of the historic object (string) in this zone.

A similar situation existed at 23 CL 275, some 350 m northeast of 23 CL 273 on the floodplain. Here, after scraping and clearing the surface, a larger area was excavated (14 2 by 2 m squares, 9 being contiguous and separated by 20 cm balks; see Figure 4-4 and Plate 4-3) to a depth varying from 0.5 to 0.7 meters. This site which produced a greater variety of artifacts (including shell-tempered sherds) than did 23 CL 273, but no evidence of structures or features. Given the size of the area excavated (ca. 56 sq. m), the number of artifacts recovered is not impressive, as Table 4-2 reveals. In short, fewer than 2 sherds came from each square meter excavated, and the density of lithic debitage (all classes) is about 0.5 for each square meter.

We offer the following explanation for the conditions we observed at sites 23 CL 273 and 275. We believe the artifactual remains of the two sites are situated reasonably close to their original location, and have not been carried in and deposited by fluvial agencies. The prehistoric aboriginal settlement or activity loci were undoubtedly abandoned for a long time, on the order of centuries, before Euro-American agricultural practices were introduced. By this time, these two sites may already have been altered from their aboriginal condition (e.g., disturbed by rodent activity, removal of organic materials by decay, etc., translocation of cultural objects through frost action or desiccation cracks, and so forth). At any rate, the state of these sites when the Little Platte floodplain began to undergo cultivation cannot be ascertained. Perhaps, they were relatively intact (e.g.,

site 23 CL 113 with its buried house floors beneath roof-falls), but they need not have been. More than a century of plowing the site locale, combined with increasingly more frequent flooding, have led to the suspension of relatively sparse cultural remains in the alluvium and alluviated plowzone.

The mechanism theoretically works like this. Early plowing very likely began the destruction of the integrity of the aboriginal deposits and contributed to the comminution of the cultural objects that it contained. Some of these materials were maintained in the plowzone and probably spread out laterally, but others could have been lost to surface erosion. At some time, the regime that was essentially maintaining or reducing the level of the floodplain changed to one that was increasing its surface elevation. In other words, the rocky fords and the riffles of the Little Platte River began to disappear under silt, and more and more alluvium was deposited over bank. As the 1915 quotation (Chapter II) shows, this process was well underway early in this century, and the "benefits" of upland soil deposition in the bottoms were widely recognized. Plowing, of course, continued, and the already disturbed prehistoric materials buried under repeated deposits of alluvium were maintained in the plowzone which was gradually ascending in absolute elevation. The cultural remains thus become more sparsely distributed through time and with the increase in the floodplain level.

Given the paucity of artifacts and complete lack of evidence for any structures and storage or refuse pits, it is difficult to conceive of 23 CL 275 and 273 as farmsteads as O'Brien's settlement pattern model suggests (1977; 1978). Whatever functions these two sites may have served in prehistoric times is impossible to determine, since the limited amount of cultural materials and the secondary context of all materials preclude any definitive identification of the place of these two sites in the Steed-Kisker settlement system.

Although the model just sketched is hypothetical, it does contribute to our understanding of the nature of sites 23 CL 273 and 275. This model does not cover all the sites on the floodplain; while it might hold for others, a more comprehensive model is needed to account for the varying conditions of all the floodplain sites. Farther on in this chapter, we consider sites in the same area reported by Calabrese and O'Brien.

As reported above, sites 23 CL 276 and 274 occupy a ridge (the T_2 terrace), 180 to 220 m west of the Little Platte River, about 30 feet above the present riverbank. These two sites have been above the general flood levels, and no floods of sufficient magnitude to inundate them have occurred within the memory of living informants. According to our earlier calculations, these two sites would have been at least 12 feet above the level of the highest flood in recorded history. This deduction does not mean that floods had no impact on these two sites, but only that they were not under flood waters.

Given their locations atop this ridge, sites 23 CL 276 and 274 are unlikely to have been the recipients of significant colluvial deposition in the recent past. The cultural remains of both sites were first detected by having the surface vegetation and upper soil zone (15 to

25 cm or ca. 6 to 10 inches) removed by motor-scraper. Only a few centimeters were removed in certain areas before we began to see what proved to be recently disturbed (translocated) cultural remains (baked clay and daub, lithic debitage, pottery) turning up in the lower part of the plowzone. Subsequent investigation of the more promising concentrations of these remains led to the discovery of undisturbed *in situ* prehistoric artifacts and structural elements only a few centimeters deeper. The point here is that *in situ* prehistoric cultural remains occur relatively near the present surface on the ridge, with no overlying alluvial or colluvial deposit at either site. The plowzone grades, sometimes imperceptibly, into the loess, while the postmolds and discrete features at 23 CL 276 and 274 penetrate into this soil zone to a depth of 50 cm. The amount of topsoil removed from these sites is conjectural. Site 23 CL 276 was a site known to local collectors (Harry Wallace, personal communication) and was discovered in O'Brien's survey because cultural remains appeared on the surface of the plowed field. Site 23 CL 274, to the north, seems to have been in pasture at the time of this survey and remained undetected. The loci of the two sites have had different land-use histories in the recent past, but it is clear that arboreal vegetation had been completely removed from each locus and that each had been plowed.

In each instance, plowing had disturbed the upper portions of each site. In addition to the cultural remains discovered on the surface, plow disturbance was evident in the scatter of fire-burned limestone rocks beyond the boundaries of the two hearths of 23 CL 276, by the amorphous and ill-defined boundaries of the upper parts of the larger features, and, perhaps, by the "sudden" appearance of the truncated postmolds. The upper, definable limits of the numerous postmolds and features at 23 CL 276 may approximate the lower boundary of the plowzone.

The final site, 23 CL 226, which is located on the east side of the Little Platte River about 1 km NNE of 23 CL 274, is situated on a sloping, westward projecting spur between 840 and 850 feet MSL; the 900-foot coutour is 0.5 km east of the site. The site locus is about 150 m east of the present course of the Little Platte, and the floodplain almost surrounds the site, ringing it on the north, west, and south, below about 830 feet MSL. To locate the reported Late Woodland component at 23 CL 226, we employed a front-end loader to scrape off the vegetation and expose swathes across the site. A stone-lined, concrete-capped well is located in the eastern part of the site locus about 10 m west of the roadside ditch which marked the eastern limit of our investigation (Figure 4-6).

Although there were faint surface indications of the Late Woodland component in the form of a few grit-tempered potsherds, most of the surface materials were of the historic (Euro-American) period. The scraping operation exposed only two prehistoric features (Feature 201 and 203) and no other undisturbed cultural remains. The numerous manually excavated test pits likewise failed to locate any significant cultural remains. Because the two features contained substantial quantities of fragmentary pottery, they are described and their contents analyzed in Chapter V. Suffice it to mention here that one feature (Feature 203) is probably Late Woodland, and the other (Feature 201) is of Steed-Kisker age, based on their contained pottery.

A scatter of rather abundant historic artifacts and relatively few prehistoric artifacts across the surface and within the plowzone characterizes 23 CL 226. The plowzone is thin and overlies a tough, reddish-brown clay. While the site was definitely cultivated, it is reported to have yielded poorly. The plowzone clearly truncated the two features, but the compact remains reveal no signs of intrusive historic materials; plowing is probably responsible for spreading prehistoric remains around. While no evidence of any structures (postmolds) exists, we cannot assume that such elements were never present. The two features discovered immediately below the plowzone may represent the lowest parts of trash-pits that were originally larger pits reaching below the level of other structural elements long since removed by erosion and plowing. Although cultivation has undoubtedly had an adverse effect on the prehistoric remains at 23 CL 226, there is no reason to believe that there was ever a substantial settlement at this place. Nevertheless, the two remnants of trash pits suggest that some domestic activities occurred here, and these may have been associated with some kind of residential structure, direct evidence for which no longer exists. The discrete, compact nature of both of the sherd-filled features indicates that they were deliberate creations rather than accidental accumulations.

In short, the post-prehistoric occupational history of 23 CL 226 has altered its aboriginal nature to the point where it cannot be reconstructed. Remnants of two trash-pits, and scanty and scattered prehistoric cultural remains in the plowzones and on the surface preclude a definitive statement of the settlement type(s) represented by the site. Identifying the function of this site as "trash disposal" is rejected since this activity presupposes other more important and common activities which produced the trash.

The final sites investigated by GAI Consultants, those located along Camp Branch near Arley, are not included in this section for the reasons that one (23 CL 232) is artifactually deficient and is hardly a recognizable site at all and the second (23 CL 229), despite extensive testing, was not intensively examined where in situ remains occurred. In the 140-150 m forest fringe bordering the north and east margins of the previously designated site area, we inserted 12 separate test units (8 1 m x 1 m pits; 4 1 m x 2 - 3 m pits). In several of these units, prehistoric cultural remains indicating a Steed-Kisker phase occupation were found among tree roots and to a depth of about 0.5m. Intensive excavation was not part of the contractual requirements for site 23 CL 229; we fulfilled these by our extensive testing and by submitting the following recommendation in the Interim report (see Appendix B). Additional work is needed at 23 CL 229, in the narrow, wooded strip along the bluff edge where in situ artifactual materials were encountered. It is our opinion that this area will be particularly vulnerable to lake-caused erosion when the reservoir is filled.

SITES PREVIOUSLY INVESTIGATED BY OTHER RESEARCHERS

Some of the previously investigated sites in the Little Platte valley have already been mentioned; the ones considered here include:

1. 23 CL 113, the Friend and Foe site, investigated by Thomas Riley (1967) in 1967, and by F. A. Calabrese (1969) in 1967 and 1968;

2. 23 CL 119, investigated by Calabrese (1974) in 1969;

3. 23 CL 118, the Butcher site, investigated by Calabrese (1969; 1974) in 1968 and 1969; and

4. 23 CL 109, the Richardson Hulse site, investigated by O'Brien (1977) in 1976.

Site 23 CL 113

Site 23 CL 113 comprises three excavated loci separated by about 213 m (700 feet) and located from 10 m (30 feet) to 135 m (450 feet) west of the Little Platte River. Situated just above 820 feet MSL on slightly elevated floodplain surfaces, the site was located in the 1967 site survey and selected for excavation because it would be the first to be destroyed by dam construction and was relatively rich in cultural remains (Riley 1967: 19). Riley and Moore excavated two 5 by 5 foot squares and later expanded their excavations near the test squares, ultimately exposing an estimated 1,100-1,200 square feet. Riley noted that Mr. Harold Harris, the landowner, had himself plowed the site and reported the abundant cultural material that he had collected from the surface. The site stratigraphy, according to Riley (1967: 22-23), consists of the thoroughly mixed plowzone (surface to 9 inches); "a relatively hard, gray-brown loam, undisturbed by plowing, in which was mixed chert, daub, and pottery" (9 to 15 inches); and at the base of this level several concentrations of burned clay daub, judged to be roof fall, resting on the living surface. Excavations terminated three inches below these daub concentrations.

The site comprised numerous postmolds and a few features (pits, ash lens) and artifactual remains. One dwelling structure built within or over a shallow basin (Riley 1967) was identified. Calabrese (1969: Map 4) depicts the house profiles which reveal the site stratigraphy, the house fill covered over by the roof fall, and the plowzone. Thin lenses of "tan silty loam" overlie the roof fall at its edges, evidence apparently of alluvial deposition on the site and over the house structure. Calabrese excavated two additional loci at 23 CL 113, discovering house structures at each. Regarding House 3, Calabrese (1967: 37) notes, "Post dating the occupation of the site, erosion, deposition, frost action and rodent activities have to some extent rearranged the local soil." Calabrese particularly laments the disturbing presence of burrowing rodents. The locus of House 3, like those of Houses 1 and 2, had been plowed. If we properly interpret the site profiles (Calabrese 1969: Map 5), alluvial deposition followed the roof fall, and the plowzone has partly replaced a more recent alluvial deposit. Harold Harris, the landowner, had "suggested that recent silting in the field south of the presently defined site may have covered other indications of structures" (Calabrese 1969: 24).

It seems reasonable to infer that depositional events have contributed to preserving the aboriginal character of the three loci at 23

CL 113 by covering them with a protective alluvial mantle. Plowing had begun to destroy the structures at the three loci through direct action and by removing the protective cover. While the full effects of recent flooding cannot be ascertained, we know that 23 CL 113 had been inundated just days before its initial examination (Riley 1967), and that "silting" had occurred immediately south of the site in floods previous to 1968.

The contrast between the three loci at 23 CL 113 and the two nearby sites that we excavated (23 CL 273 and 275) is striking, although they are in virtually identical situations on the floodplain and only 1.2 km apart at most. Comparison of 23 CL 273 and 275 with the three loci at 23 CL 113 reinforces our conclusion that very little can be said about the aboriginal character of 23 CL 273 and 275, or about what activities took place at these two loci in prehistoric times. It would be unrealistic to infer that 23 CL 273 and 275 were comparable to the 23 CL 113 loci in prehistoric times, although that is possible. Considering the great disparity between them and the structureless nature of the former two, identification of the aboriginal functions of 23 CL 273 and 275 is completely unwarranted.

Site 23 CL 119 is located east of the Little Platte and both north and south of State Route W, about 200 m northeast of 23 CL 274, and 700 m north-northwest of 23 CL 275. Investigated by Calabrese (1974), the site was excavated in twenty 5 x 5 foot squares to a depth of 1.5 feet below the surface at slightly above 820 feet MSL. The stratigraphy is described as follows (Calabrese 1974: 17):

> The soil is light brown to brown, extending to a depth of 0.7 foot. From 0.7 to 1.2 feet the soil is a darker brown. Although the fields had not been plowed in three to four years, a distinct remnant plowzone could be distinguished at a depth of 1.2 feet. In several instances, old plow furrows were discernible. Below 1.2 feet the soil consisted of a tan brown clay.

The description leads one to believe that the most recent plowzone terminates 0.7 feet below the surface, and the boundary between an older plowzone and the undisturbed subsoil lies at 1.2 feet. Recent alluvial deposition and subsequent plowing would explain the observed soil stratigraphy. This interpretation involves a gradually but progressively ascending plowzone and ground surface, and the maintenance of prehistoric cultural materials within the plowzone and at the surface, as both increased in elevation. This interpretation of the recorded stratification at 23 CL 119 is the same offered to explain the character of the cultural deposits and sediments at 23 CL 273 and 275. That it proves applicable to the observations of other investigators at other sites as well as to our own gives it additional credibility. The difficulty in determining the primary functions of such sites or their place in settlement systems models created for the district is once again demonstrated.

Site 23 CL 118

The Butcher site, 23 CL 118, investigated both in 1968 and 1969 by Calabrese (1969 and 1974), is located 4 km (2.5 miles) north of the Miller Bridge and Site 23 CL 274. It occupies a 320 m (1,050 foot) stretch 30 m to 135 m (100 to 450 feet) west of the Little Platte River at an elevation of about 830 to 840 feet MSL. For the northern unit, excavated in 1968, Calabrese (ibid.: 177) offers the following description:

> Stratigraphically, the site was shallow. The features were noted just below the base of the plowzone at a depth of one foot. Further, the bank dips off quickly in the vicinity of Feature 301. A structure may well have existed in this area, as indicated by a few post holes; however, most of it has been removed by erosion and plowing. The same is probably true in the area surrounding Feature 300. The heavy daub concentration overlying the structure at [the] Friend and Foe [site] were not found at [the] Butcher [site], except within the features. This indicates that these features were once deeper and the upper portions were eroded and plowed away. The daub within the features was too compact to be discarded rubble, indicating that structures once existed over the features.

Calabrese's interpretations are reasonable. The depth (0.84 feet) of the large pit, Feature 301, at the river bank's edge suggests that it has been considerably more severely truncated than Feature 300, a larger pit (2.3 feet deep), located about 75 feet north and a few feet higher in elevation (Calabrese 1969: Map 11). The three postmolds associated with Feature 301 suggest the former presence of some kind of a structure at this locus. It is curious that no postmolds occur in association with Feature 300, although an area of 175 square feet is depicted as having been excavated around the feature. The two features contain shell-tempered Platte Valley ware sherds and other artifactual remains and debris, but no grit-tempered sherds (ibid.: 181). The inclusion of substantial quantities of domestic debris in the two pits implies aboriginal occupation in their immediate vicinity. Whatever the causes of post-occupational alteration to site 23 CL 118 may have been, it is important to recognize the potential loss incurred in assessing the existing remains and interpreting the site's aboriginal functions and settlement system role. This caveat anticipates the following discussion of Site 23 CL 109 and the interpretations of its features by its excavator, P. J. O'Brien (1977: 53 ff. and 1979).

Site 23 CL 109

The Richardson Hulse site (23 CL 109), located 1.0 km north of the Miller Bridge and 0.5 km northwest of Site 23 CL 226, occupies the top of a broad knoll rising to above 840 feet MSL, some 30 feet above the river bank. The Little Platte River flows about 1.0 km west of the site and turns to flow 0.2 km south of it as well. The site was recorded by Pangborn in March, 1967, and tested by Riley and Moore in June (Riley 1967: 7). Relatively abundant cultural remains were recovered in the test excavation and from the surface; these included unutilized chert

debitage, a few chipped stone implements (drill, celt fragments, blades, blade fragment), a hematite celt, and 38 sherds, both shell-tempered and grit-tempered. Of the ceramics, Riley (1967: 8) said: "Several of the sherds recovered are unmistakeably Woodland in affiliation, while others appear to be some Mississippian variant. . . ." Thus, the site was initially deemed a multi-component situation.

O'Brien (1977: 54) initiated excavations in the summer of 1976 in hopes of locating Steed-Kisker houses and other subsurface structures. An extensive series of test excavations was conducted to isolate the desired features. O'Brien reports the results of the test excavations as "disappointing," only four features being located with the bulk of the site being in the plowzone. In October 1976, a road-grader was used to remove the plowzone from most of the site, an area of 2,000 by 800 feet, but only five more features were discovered, bringing the total for the site to nine. Of this total, six are identified as historic, and three are assigned to the Steed-Kisker prehistoric phase and termed "storage/trash pits" by O'Brien (ibid.: 56-59). The cultural affiliation of these three pits was made on the basis of the preponderant type of ceramic, the shell-tempered Platte Valley sherds, that they contained, but all three contained cord-marked and plain grit-tempered sherds as well. O'Brien says the grit-tempered ceramics match Calabrese's unnamed ware which she sees as being Late Woodland in cultural affiliation (ibid.: 60). On the basis of the presence of the three Steed-Kisker pits and no other evidence of prehistoric structures, O'Brien (ibid.: 54) identifies 23 CL 109 as "a new unifunctional type of Steed-Kisker site--a storage site."

Aside from the abundance of domestic rubbish (ceramics and lithic debitage, especially) in these pits, there are several other reasons related to the site's post-occupational history for questioning O'Brien's identification of the settlement system role of 23 CL 109 in Steed-Kisker times. O'Brien clearly recognizes that the site had been cultivated for years and known to collectors for years (ibid.: 53). Her initial tests, dug to depths of up to a meter, identified the plowzone lying directly above the sterile yellow loess soil over most of the site. A road-grader was finally used to remove all of the plowzone over a very large area. As mentioned, only three prehistoric features were detected, although prehistoric materials from Archaic through Steed-Kisker phase times were included in the plowzone. These three features, once probably storage pits, were filled with cultural debris of Late Woodland and Steed-Kisker phase times and were, thus, refilled during the latter period, presumably by individuals residing nearby. Afterall, how far did Steed-Kisker phase aboriginals transport their rubbish?

The three pits (Nos. 4, 5, and 6) are broad and low. No. 4 averages 93-94 cm across and is 33 cm deep; No. 5 varies from 99 to 107 cm across and is 46 cm deep; and No. 6 averages 108 to 110 cm across and is 35 cm deep. In short, the three pits are about three times as wide as they are deep, unusual proportions for storage pits in the Eastern Plains. It is clear that these pits have been truncated by recent plowing, evidence for which is extensive. Given the location of 23 CL 109 atop the broad knoll 30 feet above the low floodplain, other erosional processes would have worked to reduce the overall elevation of the locality's surface. However, plowing itself might well be the most

important of the agencies that have altered the aboriginal character of the site's prehistoric remains. Removal of the site's soil through cultivation and erosion has occurred for a century, perhaps more, and apparently, only the deepest of the prehistoric dug-features have survived. Postmold patterns indicative of residential units, if they ever existed, have been destroyed through the concomitant processes of erosion and cultivation. Since the surface and cultural remains at 23 CL 109 lie at about 840 feet MSL, they were never inundated by floodwaters (at least in recent times) or protected by layers of alluvium as were low-lying sites (e.g., 23 CL 113).

The diversity and abundance of prehistoric cultural materials from 23 CL 109, ranging from (?) Early Archaic to Steed-Kisker, suggest that this locus was often frequented over a very long period of time by prehistoric groups who conducted a variety of activities. The absence of other than artifactual evidence of the pre-Steed-Kisker groups strongly suggests that something has happened to the structures and facilities that they made and utilized. Similarly, structures ("houses") and other facilities of the Steed-Kisker groups responsible for the three "storage/trash pits" have been removed since the end of Steed-Kisker occupation. It should be pointed out, as O'Brien (1977: 54) notes, that "not even the outlines of the historic farmstead, the source of much of the surface debris" could be detected after the road-grader clearing of the plowzone. We may reasonably conclude that the Steed-Kisker dwellings have gone the way of the historic house.

SYNOPSIS OF LANDFORMS AND PREHISTORIC SITE LOCATIONS

The following points characterize the stretch of the Little Platte River valley where most of the extensive site excavations have taken place:

1. The area encompasses a linear distance of 7.4 km (4.6 miles) from north to south;

2. Drainage is dominated by the south-flowing Little Platte River, a low discharge stream of low to moderate sinuosity and now well-entrenched in its floodplain (i.e., slack water flows about 15 to 20 feet below the bank);

    a. The stream gradient is 20 inches per mile;

    b. Two perennial and about 12 short, seasonal streams join the Little Platte in this stretch;

3. The floodplain varies from about 0.1 to 0.8 km in width (measured between the 830 feet MSL contours on opposite sides of the river) and from about 810 to 830 feet in elevation;

4. On the floodplain are a few abandoned channels, now sloughs, former courses of the Little Platte;

5. Generally, gentle hills flank the floodplain; these rise gradually to rolling interfluves at 950 to 970 feet MSL;

6. Occasional steep bluffs border the river where Pennsylvanian age limestone series outcrop and form bluffs up to 90 feet high (e.g., east side of the Ross's Mill gap, west of Paradise, Missouri);

7. The maximum local relief is about 170 feet.

Inferred and documented changes to the landscape, drainage system, and hydrology of this district in historic times include:

1. The wholesale removal of natural forests from the floodplain, hill, slopes, and uplands;

2. Extensive loss of topsoil from the uplands and slopes;

3. Substantial deposition in the main channel and lower zones of the floodplain leading to the covering of former rocky fords and riffles, and the obscuring of relief on the floodplain surface;

4. Narrowing of the main channel of the Little Platte River;

5. An increase in the frequency of severe flooding and an increase in the magnitude of the floods (i.e., area and depth of flooding).

To this list might be added the several bridges and two mill dams built over or across the river, the development of a road system connecting the rural communities and residents of the area, the abortive pre-Civil War construction of a railroad bed across the southern part of the reservoir, and the recent program of building check dams and farm ponds to control soil erosion. Undoubtedly, the most significant development from an archaeological standpoint has been the introduction and expansion of cultivation which led directly to the deforestation of the uplands and bottomlands, soil loss on the higher ground and its deposition in the low areas, and last, but hardly least, the destruction of prehistoric cultural deposits through their repeated plowing. Some low-lying prehistoric habitation loci were mantled by alluvium and thereby protected to a degree. Generations of artifact collecting from prehistoric sites have altered their contents and biased collections made in recent surveys and excavations.

The changes in the landscape brought about in recent times lead to difficulties in characterizing the aboriginal settings of the prehistoric sites found and investigated. Prehistoric assemblages completely suspended in repeatedly plowed alluvium are a case in point. Nevertheless, we offer the following categorization of prehistoric settlement loci along the Little Platte River in the lower Smithville Lake reservoir. Sites are located:

1. Immediately adjacent to the main watercourse on a low ridge (? levee) now only slightly elevated about the general level of the floodplain, e.g., Houses 1 and 3 at 23 CL 113;

2. On low eminences in the floodplain slightly removed from the main channel, e.g., 23 CL 273, 275, House 2 at 23 CL 113, 23 CL 119 and 114;

3. On pronounced eminences 20 to 30 feet above the floodplain, remnants of Pleistocene terraces somewhat removed from the main channel, e.g., 23 CL 274, 276, and (?) 226;

4. On well-defined hillocks some 30 feet above the low floodplain, e.g., 23 CL 109 and 110;

5. On the gentle slopes of the flanking hills, e.g., 23 CL 226, 106, 115, 120, 213, 271, and 278; also, 23 CL 108, the Chester Reeves burial mound;

6. On the interfluves above 900 feet MSL, e.g., 23 CL 104;

7. Closer to an intermittent tributary than the main channel on the low floodplain, e.g., 23 CL 240.

The foregoing classification of landforms and settlement situations should not be considered definitive; it applies only to a short stretch of the Little Platte valley and is probably not exhaustive even for this area. Nevertheless, the list suggests the variety of topographic situations that have been utilized in this restricted district. The several different situations noted for the low floodplain (Nos. 1, 2, and 7, above) may be indicative of a relatively low frequency-low magnitude flood regime during their occupation by Steed-Kisker groups. The converse need not follow for the more elevated sites; for instance, 23 CL 274 and 276, given their very specialized natures, do not imply high ground settlement necessitated by recurring flooding of the floodplain. With the recent changes on the floodplain, it is difficult to determine if sites like 23 CL 119, 273, and 275, especially, and 113 and 118 were located on the first or second bottoms. Whatever the deficiencies in our classification, it points out that prehistoric settlement patterns, even in a restricted area of a minor stream, are probably more complex than generally recognized, and that settlement system classifications that only employ broad categories like "valley bottoms, hill slopes, and bluffs" for locational designations are probably over-simplistic.

SUMMARY AND CONCLUSIONS

The archaeological investigations of GAI Consultants, Inc., in the Smithville Lake area and our review of earlier work indicate that:

1. Some sites specified for extensive excavation or testing were not worth the effort (e.g., 23 CL 208, 232);

2. The purported Steed-Kisker burial mound (23 CL 208) was only a recent pile of dirt and not a family-cemetery for Steed-Kisker groups occupying the nearby floodplain;

3. The "farmstead" character of the complex of sites now designated 23 CL 273-276 (formerly 23 CL 225) cannot be maintained because of the thoroughly disturbed and comminuted nature of the contents of 23 CL 273 and 275 and because of the unusual nature of 23 CL 274 and 276 (Chapter VI);

4. A century or more of plowing combined with concurrent alluvial deposition has so drastically altered the nature of some prehistoric remains that their aboriginal nature and function cannot be realistically identified (e.g., 23 CL 119, 273, and 275);

5. In some cases, alluvial deposition over prehistoric remains has helped protect and preserve them (e.g., 23 CL 113, Houses 1-3);

6. Plowing in conjunction with other soil removal processes has produced sites:

    a. In which the prehistoric remains are entirely or nearly entirely contained within the plowzone (e.g., 23 CL 109, 119, 273, 275);

    b. Which have only a few remaining vestiges of the deepest prehistoric structures or facilities constructed at the site by its prehistoric inhabitants (e.g., 23 CL 109, 118);

    c. In which plowing has only partly truncated the prehistoric contents but has left substantial evidence of <u>in situ</u> structural elements and other facilities (hearths, refuse pits, etc.), e.g., 23 CL 113, 274, and 276.

Appreciation of these various possibilities results in the modification of the settlement pattern typology that Patricia O'Brien (1977 and 1979) previously suggested for the district. Her "unifunctional storage site" assigned to the Steed-Kisker phase is rejected as a specific type on the basis of our reevaluation of the data from Site 23 CL 109 in comparison to the evidence from 23 CL 118 (the Butcher site; Calabrese 1969, 1974) and the sites that we have investigated in the immediate vicinity. Site 23 CL 109 typifies the situation in 6b. above in which only a few prehistoric facilities, in this case broad, shallow pits filled with Late Woodland and Steed-Kisker ceramics, escaped the ravages of the plow, apparently because of the depth to which they were originally dug. In addition, our investigations at 23 CL 273 and 275, by demonstrating their thoroughly disturbed nature, have forced removal of these two sites from the previously proposed settlement pattern scheme. One cannot assume that they were farmsteads on the basis of evidence recovered. Finally, our discoveries at 23 CL 274 and 276, to be related in detail in Chapter VIII, add two new elements for consideration in developing settlement system models for the Little Platte valley. We now turn to the analysis of the cultural remains of these two sites.

CHAPTER V

CERAMICS AND THE IDENTIFICATION OF WOODLAND AND MISSISSIPPIAN SUBSTAGES AT SMITHVILLE LAKE

INTRODUCTION

During the excavation of site 23 CL 276, the large four-sided enclosure, potsherds were recovered from most features and from many excavation units within the enclosure (see Figure 8-7 for the distribution of the pottery). Preliminary field examination revealed the presence of both shell-tempered and grit-tempered wares. Often, the same features produced both kinds of pottery. Similarly, sites 23 CL 274, 226, and 229 produced both grit- and shell-tempered pottery, from the same features in the case of the former two sites.

Early and partial appraisal of the Smithville Lake ceramics led this investigator to begin to question the idea that the two ceramic wares were contemporary, in spite of their intimate association in various features at three different sites. The specimens of each ware looked and felt "different." Not only are there differences in the aplastic inclusions (i.e., tempering materials), there are also major differences in rim profiles and vessel forms, surface treatment, and vessel wall thickness of the shell- and grit-tempered wares. The gradual appreciation of the differences between the two wares led eventually to the working hypothesis that, rather than being contemporary, these distinctive wares were the products of fabrication over a substantial but unknown period of time by different human groups. The explicit problem formulation and test implications will be presented later in this chapter, after the ceramic interpretations of previous investigators in the area are reviewed.

F. A. CALABRESE'S 1969 CERAMIC CLASSIFICATION AND INTERPREATION

The earliest formal investigations in the Smithville area were conducted by persons from the University of Missouri in 1967 when site surveys were undertaken and when one site, 23 CL 113, was partially excavated under the direction of Thomas Riley (1969: 2). On the basis of his analysis of the ceramics from 23 CL 113 and surface collections, Riley identified both Woodland (i.e., limestone tempered) and Mississippian (i.e., shell-tempered) wares at Smithville. In 1968, F. A. Calabrese directed the excavations at 23 CL 113 (the Friend and Foe site) and initiated excavations at 23 CL 118 (the Butcher site). Calabrese had the goals of demonstrating the relationships of the Little Platte Valley Mississippian sites with those of the Missouri River Valley near Kansas City (the Steed-Kisker site, especially) and to suggest the western Mississippian (i.e., Steed-Kisker culture) origins of the Doniphan phase of the Nebraska variant of the Central Plains culture (Calabrese 1969: 2). Calabrese concluded that a "genetic relationship" existed between the two sites he studied and the Steed-Kisker complex and that the Doniphan phase was "derived from the Mississippian

base present in the Kansas City and surrounding areas" (ibid.: 219). Calabrese returned to resume work in 1969, but heavy rains and impoverished archaeological sites resulted in only modest additions to the data base (Calabrese 1974).

In his 1969 report, Calabrese identified two wares which were recovered from 23 CL 113 and 118: the Platte Valley ware, the shell-tempered ceramic, and an Unnamed ware, which was grit-tempered. Calabrese assumed identity between the Platte Valley ware and the ceramics from the Steed-Kisker type site on the basis of: 1) his own comparison of the ceramics he had excavated with those from the Steed-Kisker site in the collection of J. Mett Shippe (personal communication, September 21, 1979); and 2) Waldo Wedel's statement that the 23 CL 113 and 23 PL 13 (Steed-Kisker site) ceramics were very similar (Calabrese 1969: 68). Calabrese's Unnamed ware was represented by 180 body sherds and 6 nondiagostic rim sherds (ibid.).

In February 1979, I was able to examine the ceramics from sites 23 CL 113 and 118 at the Midwest Archaeological Center in Lincoln, Nebraska. This examination and direct comparison with sherds from 23 CL 274, 276, and 226, which GAI Consultants had excavated, reinforced my subjective feeling that the grit-tempered sherds belonged to a different ceramic tradition (or traditions) than does the shell-tempered ware. One of the project consultants, Dr. Dale Henning, is convinced of the Woodland character of most of the grit-tempered sherds we had recovered and, in fact, sees the possibility of several Woodland substages being represented. Calabrese, on the other hand, remains convinced that the grit-tempered ware from 23 CL 113 and 118 had been produced by the same peoples who had made the shell-tempered ware (personal communication, September 21, 1979).

In order to bring this debate into sharper focus, Table 5-1 was prepared to present the basic information on the ceramic attributes from the two sites reported by Calabrese (1969). Examination of this table should demonstrate that the two wares defined by Calabrese differ in most major characteristics. Here then is evidence suggesting that the two wares belong to two different ceramic traditions. The mutually exclusive distribution of five or six major paste, surface treatment, and vessel form characteristics hardly seems consistent with the thesis that the two wares were made by people of the same culture. Before moving on to the analysis of the ceramics we recovered, the discussion will review Wedel's description of the Steed-Kisker ceramics and O'Brien's description of the pottery recovered from two sites she investigated in the Smithville reservoir.

POTTERY FROM THE STEED-KISKER SITE (23 PL 13)

It is not surprising that Calabrese attributed both the grit- and shell-tempered wares to the same people or culture, since Wedel had apparently informed him that the latter was very similar to the Steed-Kisker ceramics and since this site had also produced a little grit-tempered pottery. Wedel (1943: 73 ff.) characterized the pottery from the Steed-Kisker site (23 PL 13) on the basis of 2332 sherds including

279 rim sherds and three restorable vessels. He reports that grit-tempering was comparatively scarce occurring "occasionally in conjunction with shell in less than 11 percent of the total" (ibid.: 74). Wedel describes the grit-tempered ware as mainly being sand-tempered, "less commonly of angular siliceous particles" (ibid.: 79), and having a dull brick red aspect distinct from the shell-tempered ware.

Wedel reports that one pit (No. 8) contained 180 grit- and 12 shell-tempered sherds, a reversal of the usual proportions on the site. This single pit then accounted for 71 percent of the grit-sand tempered sherds from 23 PL 13. A more realistic proportion of grit-sand tempered sherds to shell-tempered sherds in the Steed-Kisker assemblage is rather the percentage 75 is of 2065 (eliminating the contents of pit 8); the grit-sand tempered sherds make up only about 3.5 percent of the reduced total.

Regarding the form of the grit-sand tempered potsherds, Wedel (ibid.) says "the rims present do not appear to differ from those of the larger shouldered shell-tempered jars." He notes the presence of one large handled sherd containing both grit- and shell-tempering and reports only six grit-tempered sherds with cord-roughened surfaces. Decoration on the grit-sand tempered sherds, when "present, was by incising, identical in all details to that employed on the shell-tempered pottery" (ibid.). Unfortunately, the number of incised grit-sand-tempered sherds is not reported.

In summary, grit- or sand-tempered potsherds form a very minor proportion of the Steed-Kisker corpus but are considered to be an intrinsic part of the assemblage. However, even Wedel's data from the Steed-Kisker site suggests the possibility of a pre- or non-Steed-Kisker component represented by cord-roughened sherds and the presence in one pit of 180 (of a total of 192) grit-sand-tempered sherds. Conceivably, this hypothetical component could belong to the Woodland or Central Plains (Nebraska Variant) traditions.

The shell-tempered pottery (actually leached and shell-less) is described by Wedel (ibid.: 74) as varying considerably in color (gray, brown, buff, orange-buff), having a smooth, fine, gray paste, and having surfaces occasionally well smoothed and polished, but always pitted where shell-temper particles have been removed. Vessel forms include medium to large jars of two basic classes, one in which the vessel mouth equals or approximates the largest inner circumference, the second in which the mouth is much smaller than the largest interior circumference because the vessel walls converge toward the top in the form of broad sloping to nearly horizontal shoulders (ibid.: Figure 10, p. 76). These vessels exhibit hemispherical or flattened bases.

The rims of the first class of vessel seem to be simple, in general, without thickening, beveling, rolling, etc., or decorative elements, except, in a few instances, when a small bird or animal effigy head is present. This vessel form tends to be small (ca. 12-15 cm wide, 7-8 cm deep.). The second class comprises larger vessel varying between 25-45 cm in maximum diameter (at or just below the shoulder), 15-30 cm in height, and having a mouth diameter about two-thirds the maximum diameter. A short neck is typically present in the form of a vertical

or out-flaring rim with a rounded, undecorated lip. Some vessels of this class have loop handles emanating from the lip and curving downwards to join the body above the angle of the shoulder. Wedel (ibid.: Table 7) reports 350 incised sherds (15.2 percent of the total), but notes that the proportion of decorated sherds probably under-represents the proportion of incised decorated pots in use since these decorations were restricted to the shoulder-neck zone of the pots. Anticipating our description of the shell-tempered pottery we recovered, I see no major differences between it and the Steed-Kisker ware except in the much greater frequency of incised decoration and the presence of animal effigy heads in the Steed-Kisker assemblage.

CERAMICS AND CULTURAL STAGES AT SITES 23 CL 109 and 23 CL 119

The Richardson Hulse site, 23 CL 109, was investigated by Patricia O'Brien in 1976. It is located about 1.4 km north of 23 CL 276 and .5 km northwest of 23 CL 226. 23 CL 109 is located on the second terrace bordering a former channel or tributary of the Little Platte River. O'Brien (1977: 53 ff., especially 83-84) identifies several components at the site: Nebo Hill (Middle Archaic), Late Archaic, Kansas City Hopewell, Late Woodland, Steed-Kisker, and historic Euro-American.

O'Brien identified the Kansas City Hopewell component on the basis of 88 plain-surfaced, sand-tempered body sherds and four rims (ibid.: 60). In a single small pit dominated by shell-tempered sherds were four rims; two are plain, one has stick notching on the lip, the fourth a wavy lip. None of these sherds display the classic decorative motifs of the Kansas City Hopewell, much less the typical tempering material (grit). However, similar sherds from the Yeo site (23 CL 199), 2.5 km southeast of 23 CL 109 on Camp Branch creek, have been examined and assigned to the late end of the Kansas City Hopewell development by Dr. Alfred Johnson, according to O'Brien (ibid.: 35). This least distinguished, undecorated variety of Kansas City Hopewell pottery now appears to serve as a horizon-marker in the north Kansas City area.

The grit-tempered sherds from 23 CL 109 include 26 cord-roughened and 45 plain-surfaced sherds among which are one plain, one cord-roughened, and one brushed rim sherd (ibid.: 60). According to O'Brien (ibid.), "these sherds match Calabrese's (1969: 75-76) Unnamed [grit-tempered] Ware description except for the brushed surface and the lip notching. . . .Calabrese's description seems to apply to the pottery of the Late Woodland period of the Kansas City area."

O'Brien's final ceramic occupation at 23 CL 109 is the Steed-Kisker, identified by the relatively abundant shell-tempered sherds (17 rims, 284 plain-surfaced body sherds, 11 cord-roughened body sherds) (ibid.: 59-60). Only two rim sherds are illustrated (ibid.: Figure 13, a and b) and both reveal profiles of a vessel with a low rim, moderately everted lip, with a steeply sloping shoulder. "In all respects these [shell-tempered] sherds fit the description of Calabrese's (1969: 69-71) Platte Valley ware" (O'Brien 1977: 60).

For the late prehistoric ceramic chronology in the Smithville area, O'Brien posits a very tenuous late Kansas City Hopewell presence, a Late Woodland substage, and a Steed-Kisker Mississippian substage. Related to the Christian calendar, these cultural substages would range from A.D. 500 (or somewhat later) to about A.D. 1250 with no C14 determinations for the early end and somewhat confusing ones for the later part of the continuum (e.g., two discordant dates from a Steed-Kisker storage/trash pit, Feature 5, at 23 CL 109: A.D. 690 and A.D. 1115). O'Brien's suggestion of a late Woodland substage of cultural development in the Smithville area is important in the interpretation of the ceramics from the sites GAI Consultants have investigated. Unfortunately, however, detailed information on sherd and vessel morphology and paste characteristics are not available in O'Brien's report, thus close comparison with the pottery from the sites we investigated (23 CL 276, 274, and 226) is not possible.

PROBLEM FORMULATION AND METHODOLOGY

The major working hypothesis guiding our ceramic analysis is that the ceramics from sites 23 CL 276, 274, and 226, represent at least two ceramic traditions which were not contemporary. Related to this hypothesis is the delineation of the culture-historical substages the ceramic traditions represent, that is, the identification of Woodland and Mississippian (Steed-Kisker) phases of occupation at the sites under study.

Another line of investigation involves the use of ceramics in the delineation of events and activities at 23 CL 276, especially, because of its complex and unusual nature (see Chapter VIII). The potential of the ceramics in illuminating these events and activities explains the reason why the description and discussion of site 23 CL 276 has been placed in a chapter following the ceramic analysis. Conversely, the distribution of ceramics at this site has a contribution to make to the cultural and temporal differentiation of the grit- and shell-tempered pottery and data anticipating the full discussion presented in Chapter VIII will be utilized in this one.

Identification of the makers of the large four-sided structure at 23 CL 276 is another possibility that may be realized from the ceramic analysis. This line of investigation will be included in Chapter VIII where the structure and associated features are described. Problems which plague the attempts undertaken here include the general absence of physically stratified cultural deposits in any of the sites we have investigated and the lack of a full spectrum of radiocarbon dates for the time range the sites were occupied.

With the foregoing background and the dimensions of the problem stated, we may now offer an explicit statement of the hypothesis, which is:

> The ceramics from sites 23 CL 274, 276, and 226 were made and used by different societies over a long period of time, that is, by Late Woodland and Middle Mississippian groups who separately utilized the sites at different periods within about one-half a millennium.

This hypothesis will find support if:

1. The ceramics from these sites exhibit observable and measurable physical and stylistic variability of bimodal (or greater) nature for a number of major characteristics, i.e., marked heterogeneity rather than homogeneity prevails in the ceramic assemblages;

2. The time period involved for the occupations which left the ceramics can be shown to span several centuries crossing a recognized culture-historical boundary;

3. There is, in some instances, a mutually exclusive distribution of the different ceramic wares in discrete depositional units, cultural or natural.

In short, we plan to:

1. Demonstrate the non-uniformity of the ceramic assemblage from the three sites;

2. Show the extended period of occupation of the site; and

3. Present the instances of the mutually exclusive distribution of the two wares.

METHODS OF RECOVERY, RECORDING, DESCRIPTION, AND ANALYSIS

A more or less traditional approach has been taken in the analytical treatment of the pottery from 23 CL 274, 276, and 226 in order to insure classificatory systems comparable with earlier studies and in order to deal with similar historical problems. It should be emphasized that neither the Scope of Work of the contract nor the proposal GAI Consultants prepared for this project require wide-ranging cultural and historical comparisons and formulations. Thus, the methods described herein have been tailored for use in the limited context of comparing site assemblages in the Little Platte drainage around Smithville, the only ones which I have had the opportunity to examine or study in detail.

Our field recovery methods have already been described. Mainly, sherds were recovered in the excavations of features, or in 1 m by 1 m or 2 m by 2 m excavation units. Often, particular sherds were more precisely located (to the centimeter). They were subsequently cleaned and cataloged by lot or individually depending on their provenience. A coding card had been devised (Table 5-2) following and expanding on one used previously by Calabrese. On these forms were recorded our observations and measurements for each sherd from the various sites. Rim sherd profiles were drawn on the back of the form as were decorated sherds.

The major categories and specific attributes recorded are evident by inspecting Figure 5-2, Pottery Recording Form. The recording by

laboratory assistants was standardized by a short period of instruction and subsequent checks and corrections. One person made the observations and measurements and a second recorded them. I made the later paste and temper constituent identifications. A few words about the observations and measurements are in order:

1. Surface color designations were standardized by using the Munsell Soil Color Chart but each sherd was not compared directly with the chart;

2. Hardness was determined by using a Mohs mineral hardness kit, each sherd being brought into contact with at least two mineral specimens; sherd hardness is recorded as, for example, 3-4 when the sherd scratched the mineral with a hardness of 3 and was scratched by a mineral with a hardness of 4.

3. Tempering was determined by visual examination using a 10 power hand lens and 10-40 power binocular microscope. The pottery identified as shell-tempered is in fact mainly without any observable shell but is replete with small holes or pits where the shell has been removed apparently by leaching. The grit-temper is crushed rock (quartz, granite) or quartz sand and sometimes granules. A fuller description of the temper and paste awaits thin-section analysis now underway.

4. Paste texture was impressionistically appraised; the shell-tempered paste commonly reveals a tightly laminated structure, sometimes convoluted, with the shell platelets aligning themselves with or defining the laminae.

THE CERAMIC ASSEMBLAGES FROM SITES 23 CL 276, 274, AND 226

Introduction

The ceramics from the three sites, 23 CL 276, 274, and 226 will be considered together for the following reasons:

1. The sites are in close proximity to each other, within a linear distance of 1.3 km;

2. Overall similarities are shared by the shell-tempered assemblages as is shown by the following observations:

    a. They share the same rim forms with limited variability (one noteworthy exception);

    b. With two exceptions, all the sherds are without surface or rim/lip decorations;

    c. Rim sherds from both 23 CL 276 and 23 CL 226 have loop handles.

3. Because of the conjunction of grit- and shell-tempered sherds in features at each site;

4. The sherds from Feature 201, 23 CL 226, represent the remains of the one partly reconstructable pot from the three sites; this specimen is the basis of the idealized typical shell-tempered vessel from these three sites.

Intersite Distribution of the Ceramics

The relative proportions of the grit- and shell-tempered pottery at each site are given in Table 5-3 where respective frequencies by sherd count and weight are presented. At 23 CL 276, the shell-tempered sherds account for 75.3 percent by count and 64.4 percent by weight of all the pottery. At 23 CL 274, the comparable values are 85.4 percent and 93.9 percent and at 23 CL 226 they are 81.4 percent and 94.8 percent.

The grit-tempered sherds comprise a variable proportion of the ceramic assemblages, but noteworthy at 23 CL 276, they make up a quarter by count and more than a third by weight, a significant if minor fraction of this assemblage. At the other two sites, grit-tempered sherds account for only 5-6 percent by weight or 15-19 percent by count. Also interesting is the fact that, at 23 CL 226, grit-tempered sherds comprise only 2.4 percent by count and 1.5 percent by weight of the potsherds from Feature 201, crammed full with several broken shell-tempered vessels, while Feature 203 at this site contains 19 grit-tempered sherds weighing 57.4 gm and only one (0.5 gm) shell-tempered sherd.

Table 5-4 presents a full listing of the distribution of potsherds at the three sites. The variation in frequency and proportions by feature or area at 23 CL 276 and 226 is easily seen. A fuller discussion of this distribution will be found in Chapter VIII. Here, it will suffice to draw attention to Features 2, 11, 16, 17, and 20 at 23 CL 276. Feature 2 contains the largest number (N = 249) of sherds (wt. = 1159 gm), 90 percent by count and 86 percent by weight being shell-tempered sherds. Feature 11 has only shell-tempered sherds, 42 of them (wt. = 72.8 gm). Features 16 and 17 also have high proportions of shell-tempered sherds (72.0 percent and 84.2 percent, respectively). But, Feature 20, a large hearth outside the structure, contains only one shell-tempered and 19 grit-tempered sherds among the layer of fire-burned rocks, a reversal of the general proportions elsewhere in the site; the presence of several shell-tempered sherds above and in the upper part of Feature 20 suggests their later deposition and penetration into the feature (see discussion below).

Features 11 and 20 (the fire-burned rock layer only) at 23 CL 276, Feature 107 at 23 CL 274, and Features 201 and 203 at 23 CL 226, provide the best examples of the <u>nearly</u> mutually exclusive distribution of shell- or grit-tempered pottery in discrete cultural depositional units. The single shell-tempered sherd among the fire-burned rocks in Feature 20 is debilitating but not fatal to the thesis of temporally distinct phases of occupations at 23 CL 276. Other shell-tempered sherds were recovered in the uppermost part of this feature. Later activities could easily have disturbed features of earlier occupations, but more about this material in Chapter VIII.

In this section, using distributional attributes of the ceramics, we have attempted to show:

1. That each of the three sites has both wares;

2. The intersite variation in the frequencies of the two wares;

3. The great intrasite distributional variation in wares;

4. The presence of features with only shell-tempered sherds (Feature 11, 23 CL 276, and Feature 107, 23 CL 274), or with almost the opposite situation, i.e., grit-tempered sherds account for all but one sherd in each instance, in Feature 20, 23 CL 276, and in Feature 203, 23 CL 226.

5. The culturally "mixed" nature of most features at the three sites, a condition which may reflect the effects of sequential utilization of these loci by different social groups.

THE SHELL-TEMPERED POTTERY

Rim Sherds and Vessel Form

This characterization of the shell-tempered pottery will be based mainly on rim sherd morphology and paste characteristics. The main thrust of the ceramic analysis offered here is to compare and contrast the grit- and shell-tempered wares for purposes of determining their relative uniformity or heterogenity. Description of the rim areas of the shell-tempered vessels will allow comparison with the same areas on the grit-tempered potsherds and should result in the differentiation of the two wares based on the areas in which each ware displays the greatest degree of variability in form. The shell-tempered rim sherds exhibit a series of surface colors ranging from reddish-yellow (Munsell 7.5 YR 7/4) to very dark gray (Munsell 2.5 Y 3/1). Although, this range of surface color variation does not support the thesis of relative uniformity for the shell-tempered pottery, neither does this variation refute it, given the trans-firing and post-firing factors that can influence paste color and condition.

The metrical attributes of the shell-tempered rim sherds are presented in Table 5-5 and the rim sherd profiles are displayed in Figure 5-1. A qualitative characterization of the shell-tempered pottery will precede the statistical characterization. The idealized shell-tempered vessel is a smoothly globular, slightly flattened or round-bottomed container with slightly to moderately pronounced transition to the shoulders which converge to the rim at a fairly to moderately steep slope. The always short rim emerges smoothly but strongly from the shoulder to form a (generally) flaring, slightly everted lip. Figure 5-2 depicts our reconstruction of the large vessel recovered from Feature 201, 23 CL 226, which fairly reflects the ideal form of the shell-tempered vessels from the three sites. The cross-sections of 20 rim profiles are presented in Figure 5-1 which displays the variation in rim/lip thickness, degree of eversion, and rim height.

Metrical Attributes of the Shell-Tempered Rim Sherds

Table 5-5 presents the raw data and Table 5-6 the summarized data on which this discussion is based. The reader is reminded that the total sample of rim sherds used for characterization of the shell-tempered ware numbers only 35 sherds, and that this number accounts for all the shell-tempered rim sherds from the three sites.

In terms of vessel form and size, rim sherds can provide only partial information, of course, but we can determine from those with attached shoulders that these vessels ranged in maximum breadth from greater than 20 cm to greater than 36 cm. Unfortunately, we cannot determine the range for the height of the vessels and volumetric estimates are therefore unrealistic. However, if the single reconstruction based on sherds from Feature 201, 23 CL 226 (Figure 5-2 and Plate 5-1:a), can be used as a standard for comparison, the shell-tempered pots were of only moderate height, less than their maximum breadth. This reconstructed vessel measures 28 cm in height and 34 cm in breadth. In support of this idea, no body sherds, because of their bi-axial curvature, can be attributed to cylindrical or even conical vessel forms.

On this squat, globular, gently shouldered vessel body, the rim rests, a low, weakly developed feature, standing from less than one to less than two centimeters above the shoulder. The mean rim height (at 23 CL 276) is 12.3 mm (range: 7.0-18.0 mm), or less than 5 percent (4.4 percent) of the height of a 28 cm tall vessel. The rim sherds from 23 CL 274 have a mean rim height of 18.0 mm (three specimens) and at 23 CL 226, Feature 201, it is 16.5 mm (seven specimens; range: 12.0 mm-22.2 mm). The rims of the plain-surface shell-tempered ware are simple, with slightly to strongly everted lips which generally become a little thicker than the adjacent neck wall before tapering to a rounded or sub-acute lip-edge.

A few specimens (23 CL 276: #612, #891, #1526; 23 CL 226: #119.1, #173.2, Plate 5-1: b, c, d, f) have loop-handles projecting from the lip and curving down to connect with the shoulder, thus enclosing a small aperture (8 mm-14 mm across). A disarticulated loop handle (#889 from 23 CL 276) completes this lot. The foregoing description is that of a simple undecorated, plain surfaced utilitarian vessel, with loop handles on some specimens.

The exceptions to this stereotype are few. A rare example of lip elaboration is represented by specimen #1017a (Plate 5-1:e) which has a small, subtriangular tab projecting horizontally from the thickened, lightly rolled lip. Two exceptional specimens deserve extended description. Specimen #1367 from Feature 16 within the enclosure at 23 CL 276 is unusual in several respects. Besides an out-of-the ordinary paste with leached shell lacunae, it features surface and lip modification unique at this site. The surface immediately below the rim exhibits a series of incised lines (Plate 5-2:f; Figure 5-3) forming parts of two subrectangular patterns (each bounded by two or three lines) that were incised before firing. The flaring lip displays a scalloped appearance with recurrent, small, sub-triangular denticulations projecting horizontally ("saw-tooth-like") from the lip. The paste of this specimen is

somewhat granular and has a sandy texture and feeling. In color, this specimen is noticeably ligher than the typical shell-tempered sherds; it is light buff in color compared to the more typical dull tan and greyish-tan. In paste, rim form, surface and lip treatment this sherd is unique. The second unusual specimen is #1569 from 23 CL 276 (Figure 5-4). It has a simple, low, very slightly everted rim with a rounded lip. It's unusual aspect is the series of incised lines beginning at the lower edge of the rim and radiating laterally out over the surface of the shoulder. This sherd represents a smaller than average vessel if the orifice diameter (140 mm) and wall thickness (3.7-5.5 mm) are indicative. The incised design was crudely etched into the surface of the vessel after it had been fired.

Observations on Shell-Tempered Body Sherds

In terms of body sherd morphology, the shell-tempered pots are fairly thin walled (3.5-7.0 mm thick), gently curvate (globular), with smooth inner and outer surfaces. On some specimens, the inner surfaces have parallel striations or even grooves, apparently the result of the finishing treatment given the internal surfaces of these pots.

Some sherds reveal what may properly be termed a slip, identified by a thin layer of discernably different color than that of the underlying paste. Most sherds do not exhibit this slip which typically appears as a thin, dull greyish brown veneer over the light tan zone which bounds the dark gray core. Calabrese (1969: 69-71) noted the presence of slipped specimens among his Platte Valley ware sherds. If slipping was a regular custom among the makers of the local shell-tempered ware, the frequency of this practice will hardly be determinable because of the eroded nature of much of the recovered pottery. Consequently, we have not attempted to quantify the occurrence of this trait.

Two unusual shell-tempered body sherds require extended description because each exhibits cord impressions on one surface. Specimen #351 (Plate 5-2:e) is from Feature 2, the large refuse pit outside the enclosure at 23 CL 276. It's outer surface has dense impressions of a fairly complex cordage whose individual elements intersect or cross each other at approximately 30 degree angles. Z-twist and S-twist conjunctions can be seen but the overall pattern is indiscernible. Microscopic inspection of a fresh section of the sherd clearly reveals the flat, thin lacunae of the leached shell-temper in addition to some small sandy nodules in a fine sandy paste. Thus, both in paste characteristics and surface treatment, this specimen is unusual. Its presence in Feature 2 presents no problem since this refuse pit is the repository of most of the ceramic varieties at 23 CL 276.

Sherd #832 is very similar to sherd #351 in surface treatment and paste composition but differs in surface color, as if it had been refired after breakage. It comes from the eastern edge of, or just beyond, Feature 2.

Disregarding these few sherds, the shell-tempered group is a remarkably uniform one when form and surface treatment are considered. The two cord-impressed body sherds among hundreds of plain, smooth

surface body sherds and the two unique rims among three dozen rim sherds fail to diminish this generalization. The homogeneity displayed by the shell-tempered ware contrasts with the variability displayed by the grit- and sand-tempered ware in surface treatment, vessel form, rim profile, and paste characteristics as will be shown in the next section.

THE GRIT-TEMPERED POTTERY

Grit-tempered pottery includes those specimens which have as added constituents in the paste crushed rock, sand or granules, materials not naturally present in the finest constituent of the paste. This section will be centered on the discussion of the grit-tempered sherds from 23 CL 276, but those from the other two sites are included here because they demonstrate the intimate physical association between the grit- and shell-tempered sherds at these sites which are in close proximity to each other.

At 23 CL 276, grit-tempered sherds comprise 25.2 percent of the sherd count and 35.4 percent of the total weight of the recovered potsherds (see Table 5-4). Thus, grit-tempered sherds comprise a significant but minor proportion of the ceramics at this site. These figures compare with the 11 percent figure that Wedel found for the Steed-Kisker site (Wedel 1943: 77 ff.) which, as I have suggested above, might properly be reduced to 3.5 percent by eliminating the number of grit-tempered sherds (N = 180) from one pit from the calculations. At any rate, the proportion of grit-tempered sherds at 23 CL 276 is substantially greater than at the Steed-Kisker site. The significance of this difference will be considered later.

For descriptive and analytical purposes, the grit-tempered pottery has been divided into two classes, sherds with plain surfaces and those with cord-marked surfaces. The latter class, of course, provides greater opportunities for analysis based on superficial aspects (i.e., sherd surface treatment). Classification and discussion of the fabric and cord-impressed classes follows immediately after which a much briefer discussion of the plain-surfaced group is presented.

Fabric and Cord-Marked Grit-Tempered Pottery

A series of sherds with fabric-impressed or cord-marked surfaces is characterized in this section in order to:

1. Demonstrate the variability present in this attribute of the pottery from 23 CL 276;

2. Provide the reader additional evidence related to the hypothesis that the grit-tempered and shell-tempered pottery wares represent both different ceramic traditions and different chronological episodes.

Only two shell-tempered sherds exhibit cord-roughened surfaces (see above) and there are no intermediate examples of smoothed-over-cord-roughened shell-tempered sherds.

An exhaustive analysis of cordage impressed sherds (cf. Hurley 1979) was not conducted as the purpose was mainly to ascertain the gross variability in surface impressions and not to reconstruct prehistoric cordage. A total of 45 grit-tempered sherds exhibit cordage impressions. Positive molds of their surfaces were made using non-hardening modeling clay (Amoco Plast-i-Clay). In conjunction with the sherd surfaces, these molds were examined under low angle fluorescent light with and without the use of a ten-power hand lens. A few sherds originally identified as being cord-impressed were rejected on the basis of this examination, a few more were transferred from the plain surface category, and two were removed to a third category (i.e., specimens with scraped surfaces).

Most of the cord-marked grit-tempered sherds have abraded surfaces, and the impressions are only faintly or moderately represented. Consequently, only the most clearly impressed of the cord-marked sherds were utilized for the characterization of this attribute; this sample amounted to 20 out of 45 sherds. Their catalog numbers, proveniences, and descriptions are included in Table 5-7. Five rim sherds, one basal sherd, and 14 body sherds are detailed.

The rim sherds represent five different vessels, each with very different rim profiles and surface treatment. Vessel 1, represented by joined sherds 1150 and 1112a, is a small (11 to 15 cm high, 17 cm wide), wide-mouth (14 cm superior interior orifice diam.) vessel whose lower form can only be guessed (see Figure 5-5 and Plate 6-2:a). It has been likened to Nebraska Culture pots by Dr. Alfred Johnson (personal communication), and Dr. Dale Henning (personal communication) sees similarities with the Glenwood, Iowa, area ceramics. This specimen is certainly unique among the 23 CL 276 ceramics and, consequently, will be separately described below in "Nebraska Culture Ceramics at Site 23 CL 276".

The two rim sherds, Nos. 1263 from Feature 17 (a fireplace) and 1087 from a spot 3 m southeast of Feature 17, represent Vessel 2 which has extremely straight, converging rims (walls) (Figure 5-1 and Plate 5-2:c.) The rim decreases markedly in thickness toward the lip, from 11 mm thick 45 mm from the lip to 3-4 mm at the lip. The vessel orifice has an inner diameter of about 24-25 cm but no hint of its height can be gained. The vessel represented would have had, when complete, converging upper walls without a differentiated rim and neck area; it is very different in form from Vessel 1. These two rim sherds are morphologically identical but they cannot be cross-mended; they are almost certainly from the same vessel and are considered as such in this analysis. They may come from the same vessel represented by basal and semicontiguous sherds found in Feature 20 (see below for additional discussion).

Sherd 1373d from Feature 16 (Figure 5-1) represents Vessel 3, a thin-walled vessel with slightly converging upper walls and a rounded, slightly rolled lip. This specimen is small; only a 17 mm section of the lip remains but an inner orifice diameter of 24-25 cm is indicated.

Sherd 574 from Feature 2 (Figure 5-1) represents Vessel 4. This small sherd has yet another distinctive lip form. The irregularly rounded lip exhibits short "slices" on the outer aspect and just below

Discussion of the Cord-Marked Body Sherds

Tables 5-7 and 5-8 provide the detailed information and general classification of the grit-tempered, cord-impressed sherds and serve as the basis of the following discussion. The most convincing morphological data indicating variability among the class of cord-impressed sherds is that provided by the rim sherds. The five rim sherds belong to four different vessels, each, of course, with its distinctive profile and decorative attributes. Unfortunately, the number of grit-tempered rim sherds is so small that it is impossible to generalize about the "population" they are taken from, if indeed only one "population" is represented (as seems unlikely). However, I venture to suggest the variability in rim form displayed by these few sherds represents at least two different ceramic traditions; sherd 1150/1112a (the outflaring rim with the acute beveled lip notched along its exterior border) exemplifies one (the Nebraska Aspect of the Central Plains culture, see below), and the remaining rim sherds at least one other.

As might be expected, the 14 body sherds selected for characterization (not including the 4 thought to be associated with the basal sherd 1580) display a range of variability in the surface impressions which implies that several different vessels are represented. (This is not to deny the possibility that different fabrics could be or were used on the same vessel). The selected body and basal sherd impressions are categorized according to the size (width) of the observable strands and by the spacing of the strands (i.e., density per 2 cm length). These are listed in Table 5-8.

The variability among the cord-impressions on the rim and body sherds can similarly be interpreted to indicate the existence of more than one style of surface treatment for the grit-tempered sherds. Without any restorable vessels, it is not possible to appraise how much variability occurs in the cord-impressions on a single vessel or in a group of vessels. We cannot determine, for instance, if the cord-impressed pots were entirely covered with these impressions or if they were restricted to one part such as the neck and shoulder. We can point out that some rim sherds exhibit cord-impressions right up to the lip and the only base sherds present reveal cord-impressions (reduced by abrasion). But, many grit-tempered sherds exhibit no surface impressions and it is clear that vessels were present which had wholly or partially plain or smoothed, plain surfaces.

In this section, we have documented the presence at site 23 CL 276 of an assemblage of cord- and fabric-impressed ceramics of moderate variability in surface treatment. Although the sample of described specimens is small (20 out of a total of 45 cord-impressed sherds), the degree of variability in surface treatment of these sherds is sufficient to suggest that they may belong to more than one pottery-making tradition. This hypothesis is supported by the following evidence:

1. Seven different basic patterns of surface treatment are documented among the 15 body and basal sherds (Table 5-8);

2. The cord-impressed surface treatment of the 5 rims representing 4 different vessels is different for each vessel as identified by rim profile (Figure 5-1).

Further support for the hypothesis could come from the results of the physical examinations of the paste constituents of different specimens of the cord-impressed grit-tempered sherds. However, the results of this analysis, being conducted by Dr. James Gundersen, Department of Geology, Wichita State University, are not yet available and will be reported separately elsewhere. We anticipate that these tests will demonstrate variability among the paste components (grain-size, clay mineralogy, tempering materials) which will exceed the variability expressed in the range of cord-impressions (if one may be permitted to compare apples and oranges).

Plain-Surfaced, Grit-Tempered Sherds

Ninety-six sherds fall into the category of plain-surfaced sherds tempered with crushed rock, granules, or sand. Only two of the specimens in this group are rim sherds (No. 1273 and the cross-mended sherd catalogued as Nos. 775 and 857). There is considerable variability within this group in regard to quantity and quality of the tempering material, in sherd density, in surface texture and appearance, and thickness. This variability will be documented by describing a sample of the sherds in this category, sherds selected to represent the range of variability for the attributes under consideration.

Table 5-9 presents measurements and observations on 16 plain-surfaced grit-tempered sherds. The weight is given to provide an idea of the size of the sherds and these generally comprise the larger examples. In maximum thickness, this sample ranges from 5.8 mm to 11.6 mm, a span which could appear in a single vessel. The hardness values, 2-3 and 3-4 on the Mohs mineral scale, does not indicate much variability. The variability among this small sample becomes apparent when surface and core color are appraised. The presence of orange ("reddish") tones sets many sherds off from the shell-tempered group. Whether these sherds are the remnants of vessels fired in oxidizing atmospheres has not been determined, but this trait may indicate a basic difference in the ceramic technology of the makers of the grit-tempered and the makers of the shell-tempered pottery. Thin section analysis, to be reported on later, may shed more light on this subject.

The categories which best show the variability in this series are size of the aplastic inclusions and the proportion (percent) of the paste these aplastic inclusions comprise. Admittedly, the techniques used in these determinations are subjective in part and based on limited exposures of the sherd cores. Nevertheless, temper particle maximum size was objectively determined with the use of micrometer caliper and binocular microscopy and our estimate of temper proportion was made upon examination at 25x magnification. The temper size ranges from less than .5 mm to as much as 5 mm. The largest tempering substance is crushed quartz which is also the commonest material. Quartz pebbles are a common component of the glacial till widely present in the area. Proportional amounts of tempering material are estimated to range from 10 percent or less up to 30 percent, the most heavily tempered sherds having crushed quartz as the main constituent, the most finely tempered sherds having sand instead. The paste texture in most instances, when viewed under moderate magnification, appears quite granular, a trait

which I have characterized as ranging from silty to fine sand but without objective standards. Our thin section analysis will elaborate on paste and temper composition and this discussion should be considered preliminary.

It is appropriate at this stage of the analysis to reiterate the attributes of the plain-surfaced, grit-tempered sherds in which noteworthy variability occurs:

1. Surface and core color;

2. Temper particle size;

3. Temper density (i.e., proportion of paste made up by added aplastic inclusions).

Although discrete differences are not to be found among these attributes, they nevertheless reveal the heterogeneity that characterizes the grit-tempered sherds, in general, when a wider series of attributes (e.g., rim form, inferred vessel shape, surface treatment, etc.) are considered. Before comparing the grit-tempered and shell-tempered wares from the three sites, an attempt to identify the cultural affiliation of the cross-mended rim and body sherds, 1150/1112a, from 23 CL 276, will be presented.

NEBRASKA CULTURE CERAMICS AT SITE 23 CL 276

We have had to look to the Nebraska Culture sites for the identification of two unique, cross-mended sherds from Site 23 CL 276. As these sherds will loom large in later phases of the analysis, special effort has been made to describe them and identify their original cultural affiliation. In 1952, James H. Gunnerson published a classification of pottery found at Nebraska Culture sites excavated in the eastern part of the state. John C. Ives (1955) adopted Gunnerson's typology for use in classifying and describing the ceramics from the Glenwood area, Mills County, in western Iowa. Adrian D. Anderson (1961) similarily adopted the descriptions and terminology of Gunnerson and Ives in his analysis of more than 17,000 sherds from 12 Glenwood Focus houses excavated by Ellison Orr in 1938 and one by himself in 1957.

Several named types and three (or four) wares are conceived for this system as it is applied to the Glenwood area ceramics by Ives and Anderson. In addition, a few named types not included within the three named wares are represented by scarce or unique sherds. There are also categories for unnamed body sherds (plain, polished plain, cord-roughened, and smoothed-over-cord-roughened). The three wares (termed McVey, Swaboda, and Beckman) are characterized by globular vessel forms, the fourth (Debilka types) by neckless, golbular jars, and low bowls. The features that distinguish the three wares are related to rim morphology (form) and decorative treatment. The Swaboda group is characterized by an S-shaped wall profile (i.e., the rim expands below the lip, contracts to the neck, and expands again to form the shoulder); the other two have simple vertical, or moderately out-flaring rims. The Beckman group is

distinguished from the McVey group by virtue of having a thickened, wedge-shaped rim(i.e., a narrow lip, vertical inner rim wall, expanded outer rim wall with a definite lower margin to this beveled surface, and contraction below at the neck). The main difference between the Beckman and Swaboda groups is the presence of the horizontal groove (channel) inside the rim of the latter as compared with the straight inner rim wall of the former. The surface treatment and decorative elements cross-cut the three ware groups and the specific types within them.

Two consultants and several other individuals suggested the Nebraska Culture affiliation of cross-mended sherds, 1150 and 1112a, from Site 23 CL 276. The two sherds form part of the rim and the contiguous upper portion of the shoulder of a small, globular vessel (Plate 5-2: a) about 14 cm in diameter at the mouth, 17.5 cm in maximum width, and with an estimated height of 11 to 15 cm (Figure 5-5), depending on which reconstruction is more accurate. The paste is grit-tempered and black and the outer surface is deeply cord-impressed (see Table 5-7). The lip is sharp (acute), and below it the rim expands to form a beveled outer surface and a well-defined, wedge-shaped ridge. The inner surface is slightly concave but not enough to be called channeled. The lower margin of the beveled ridge exhibits a series of sharp-sided oblique indentations which would seem to conform to the tooled-impressions mentioned by Ives (1955: 12) for the pottery type called Beckman Pinched or Tool Impressed or Beckman Decorated by Anderson (1961: 15). If one sees the wall profile of the vessel represented by sherds 1150/1112a as being definitely S-shaped, then the designation becomes Swaboda Tool Impressed (Ives 1955: 16) or Swaboda Pinched or Tool Impressed (Anderson 1961: 10). Each type has plain and cord-marked versions.

At any rate, this specimen falls easily into the Glenwood ceramic types based on this formal comparison with the published descriptions of the pottery from the Nebraska Culture sites in Mills County. It was, thus, very satisfying when I saw very similar sherds on exhibit and in the collections of the small historical museum in Glenwood when I visited there and conferred with Mr. D. D. Davis, custodian of the collections. Unfortunately, our specimen was then being thin-sectioned and Mr. Davis did not see it. However, Mr. R. B. Aker, a life-long resident and very knowledgable collector from Parkville, Missouri, agrees completely with the Nebraska Culture designation of the sherd. This testimonial supports the results of the formal comparison and I think it is safe to say that there existed, at one time, one Nebraska Culture pot at Site 23 CL 276. The implications of this fact will be fully explored in Chapter VIII.

A CERAMIC ANVIL FROM SITE 23 CL 274

Two parts of a ceramic anvil or trowel were recovered in the excavations at 23 CL 274. This specimen is cataloged as No. 993 and its specific provenience is N1056.54, E358.63, Elevation 87.76; it is illustrated in Plate 5-2:d. The anvil is made up of a circular, biconvex disc 63 mm in diameter and approximately 21 mm thick in the center. A conical stem about 37 mm long rises gradually from one surface of the

disc and tapers to a soft point. The fractured surfaces reveals a dark grey core enclosed on either side by a light tan layer. Aplastic inclusions in the paste are not obvious in the fractured surface or outer surface although a few pits are present in the latter. (We have purposely refrained from breaking this specimen to expose a fresh, unweathered surface for examination because it is a unique example.) A thin, dull, light-brown layer covers the outer surface (where it has not been removed) and appears to be a slipped coating. The surfaces of the anvil are too eroded to allow detection of finger impressions or use abrasion. Similar specimens are reported by Calabrese (1969: Plate 2b,d) for site 23 CL 113.

COMPARISON OF THE GRIT- AND SHELL-TEMPERED SHERDS FROM SITES 23 CL 276, 274, AND 226

The data and observations recorded in Table 5-10 summarize the trait-by-trait differences between the grit- and shell-tempered pottery. The basic feature they have in common is that they are containers of moderate size. Unfortunately, the vessel forms for the grit-tempered ware cannot be reconstructed although the absence of clearly-distinguished shoulders and the extant base and rim sherds suggest a subconical vessel form whose upper walls converge gradually toward the mouth. The major form of the shell-tempered ware is a globular body, wider than tall, with a definite but low rim. The smaller, open, bowl-like vessel form known from the Steed-Kisker site (Wedel 1943: 76) and in the Glenwood, Iowa, sites (Ives 1955; Anderson 1961) is not recorded for the sites we have investigated. From rim morphology alone, the shell-tempered sherds and grit-tempered sherd clearly represent substantially different vessel forms.

Other attributes examined support the basic dichotomy based on temper distinctions and reinforced by deductions on vessel form. Body sherd thickness exhibits a bimodal distribution for the two wares, the mean thickness of the grit-tempered sherds being 2.6 mm greater than that of the shell-tempered sherds. Figure 5-6 graphically displays the distribution of body sherd thickness measurements for the two wares from site 23 CL 276 and Table 5-11 presents the statistical comparison based on the grouped data in Figure 5-6. These statistics clearly demonstrate the dichotomy between the two groups of sherds based on the simple metrical attribute, body sherd thickness. We question if the two samples could be drawn from the same population and pose the null hypothesis that the difference between them is not too great to have happened by chance.

To test the null hypothesis, we set the level of significance at .01 and employ the z-statistic (Shao 1967: 402-412) to determine if the two samples could have been drawn from the same population. The formula and calculations are presented in Table 5-11. In a two-tailed test, $z = 14.108$ means that the two samples are likely to have been drawn from the same population by chance much less than one in a thousand times. Thus we conclude that the samples of grit- and shell-tempered sherds are drawn from two different and distinct populations. This conclusion was

obvious from the comparison of the two wares using nonmetrical attributes. It is always reassuring, however, when metrical and statistical analyses support one's qualitative and subjective assessments of the data.

The two ceramic wares differ also in surface treatment. The shell-tempered ware is very uniform in having plain, smooth surfaces (only two exceptions among 667 sherds). Over a quarter of the grit-tempered sherds have cord-impressed surfaces, and several patterns are represented. Since we found no complete or reconstructable cord-impressed vessels, we cannot determine the distribution of this trait on individual grit-tempered vessels. We know, however, that cord-impressions appear on basal portions and on rims immediately below the lip. Thus, possibly, entire vessels were covered with cord-impressions. But grit-tempered vessels without any cord-impressions also existed, a fashion, it would seem (as we have noted earlier), that was popular in the late Kansas City Hopewell sequence. The two shell-tempered sherds with cord-impressions comprise 0.3 percent of the total number of shell-tempered sherds, but cord-impressed sherds comprise 22 percent of the grit-tempered series from the 3 sites.

By this point in the discussion, the dichotomy between the grit- and shell-tempered series has been demonstrated (perhaps, ad nauseum). The two groups differ completely in tempering material and vessel form (including rim profile). Only the latter exhibits slipped surfaces (albeit rarely). Only the shell-tempered series has appendages (loop handles), rim-lip tabs, and incised decorations, which are not typical, however, in the Smithville Lake assemblages. Only the grit-tempered group displays frequent cord-marked surface treatment.

Distinguishing these two wares on morphological grounds does not, in itself, demonstrate that two different cultural components are manifested at these sites. Ideally, we would like to be able to demonstrate their complete spatial separation, either stratigraphically or horizontally, or both. Unfortunately, this is not completely possible, although there are a few instances where this can be done for discrete features, one of which will be reviewed in the next section.

SHERD DISTRIBUTION IN FEATURE 20, SITE 23 CL 276

Feature 20 is a concentration of fire-burned limestone rocks located outside the northeast corner of the four-sided structure at 23 CL 276. It stretches about 2 m east to west and 1.5 m north to south and lies between 88.51 and 88.24 meters in elevation. The feature was encountered during the process of excavating the 2 m by 2 m square whose southwest corner was N881, E 293. The southwest part of the feature was found in the northwest corner of this excavation unit. The fire-burned rocks initially exposed were covered and left in place until we could return to the site and fully excavate the feature; this was done in May 1979 by which time we had some appreciation for the possible multicomponent nature of the site. Excavations below the artifically prepared surface exposed the remaining part of the concentration of fire-burned rocks, some pottery, generous quantities of charcoal, and a few lithic

implements. The pottery comes from the zone above the formal upper boundary of the feature (as defined by the layer of fire-burned rocks) as well as among the fire-burned rocks at its base. The charcoal samples taken for C14 dating and botanical identification come from among the layer of rocks.

It would appear that the upper part of Feature 20 has experienced some disturbance for fire-burned rocks are scattered to the northwest of the main concentration at elevations about 5-10 cm above the latter. Plowing or other agents may have been responsible for the dispersion of fire-burned rocks from the originally intact hearth. However, since we found no boundary separating the plowzone from the subplowzone, that is, no clear evidence of plowing at this depth, it seems more probably that the fire-burned rocks northwest of Feature 20 were removed and redeposited in prehistoric times.

The distribution of pottery within and above the feature is of considerable interest. In Figure 5-7, the location of the individual potsherds are plotted to show the vertical relationship of the grit-tempered and shell-tempered sherds. Eighteen of 19 grit-tempered sherds come from the layer of fire-burned rocks which form the base of the feature and one lies in a few centimeters above the rocks. Seven of 11 shell-tempered sherds come from above the highest point reached by the rocks and 4 shell-tempered sherds come from the upper 3 cm of the zone bounded by the fire-burned rocks. Only one shell-tempered sherd comes from down among the rocks. As mentioned above, many of the grit-tempered sherds are semicontiguous elements of the base and lower walls of a fabric-impressed, subconial vessel. On the basis of distributional data, we suggest that the grit-tempered sherds are an intrinsic part of the original feature, that is, they are contemporary with the layer of fire-burned rocks, and that the shell-tempered sherds are later additions, left above the layer of rocks and mixed into the intermediate zone and, in one instance, to the level of the rocks. In short, the data from Feature 20 are interpreted to mean that an earlier occupation was responsible for producing the hearth, a concentration of fire-burn rocks and associated charcoal and grit-tempered sherds. Later activity introduced the shell-tempered sherds into the area occupied by the hearth stones while removing and dispersing some of the fire-burned rocks and grit-tempered pottery to the northwest (see Figure 8-7).

This interpretation is based on the stratigraphic relationships evident within and above Feature 20. The plotting of the spatial relationships shown in Figure 5-7 was made possible by the careful recording of the precise provenience of each sherd in and around the feature (with two exceptions, one recorded as "surface" the other as "bottom of feature"). If the basal and semicontiguous lower wall sherds from Feature 20 are from the same vessel as rim sherds 1263 (from F.17) and 1087 (see above), these two rims may be further evidence of the removal of sherds from Feature 20, although it must be admitted they may not mean this at all. It is unfortunate that we cannot determine for certain if these sherds come from the same vessel or not. If they do, as we believe, the two hearths (F.17 and F.20) could be considered very nearly contemporary and would serve as a nice check on the radiocarbon assays

from the charcoal of the two features. These determinations are discussed immediately below.

CERAMICS, RADIOCARBON DATES, AND MULTIPLE COMPONENTS AT 23 CL 274, 276, AND 226

The hypothesis that there are multiple components at Sites 23 CL 226, 274, and 276 is supported by the bimodal variability present in the ceramics. Calabrese (1969) had previously noted the marked differences between his Unnamed (grit-tempered) ware and the (shell-tempered) Platte Valley ware. Our analyses have confirmed the distinction of these two classes of pottery. In addition, we have identified in the ceramic assemblage of 23 CL 276, two cross-mended, grit-tempered sherds that form the partial upper wall and rim of a vessel that conforms in all formal attributes to the type called Beckman Tool Impressed in the Glenwood, Iowa, assemblages. This specimen is clearly distinct from both the numerically predominant Platte Valley ware and from the other grit-tempered specimens.

On the basis of two articulating sherds, it would be foolhardy to postulate the presence of a Nebraska Culture component at 23 CL 276. Yet the presence of these two sherds, one from the Feature 2 midden, the other from within the structure, indicate the two elements were present when the midden fill was deposited and when the area of the structure was partially cleared of surface debris. In other words, the Nebraska Culture pot was present when the structure was erected. The *raison d'être* for the Nebraska Culture pot is a matter for speculation but one thing seems clear concerning it; it was contemporary with the latest prehistoric component manifested at the site.

On the basis of the ceramic classification, this component would have been that represented by the abundant Platte Valley ware which is the Smithville analog of the dominant pottery ware from the Steed-Kisker site. I have no problem equating the two, although the Smithville Lake assemblages exhibit less decoration and surface polishing than that from the Steed-Kisker type site. In other words, the Platte Valley ware may be thought of as a simpler version of the Steed-Kisker shell-tempered ceramic.

As Wedel pointed out (1943), the Steed-Kisker assemblage has a small proportion of grit-tempered pottery associated with the shell-tempered ware. Calabrese (personal communication) examined this material in Shippee's collection from the Steed-Kisker site and so have I. In the Steed-Kisker assemblage, there exists some heavy shell- and grit-tempered pottery with variable sized inclusions ranging up to 8 mm in length, small pebbles, in fact; the shell is of course missing but the pits are present on the surfaces. Some of the rim sherds of this coarse ware exhibit incised decorations on the shoulder immediately below the rim (e.g., part of an arc with straight lines radiating from its convex aspect). At least two different rim profiles are represented in these decorated, grit-tempered sherds: a simple, short, nearly vertical or slightly everted rim, and a longer markedly out-flaring form

(with an expanded lip-ledge on one specimen examined). The foregoing characterization is undoubtedly incomplete, but it serves to certify to the presence of grit-tempered, Steed-Kisker pottery in vessel forms and with decorations typical of the purely shell-tempered types.

The grit-tempered pottery from the three sites reported on in this chapter does not closely resemble that from the Steed-Kisker site, but it does closely resemble that which Calabrese (1969) reported on from 23 CL 113 and the other Little Platte Valley sites he excavated (see Tables 5-1 and 5-10). In other words, Calabrese's Unnamed ware does not correspond with the grit-tempered pottery from the Steed-Kisker site, but rather belongs to another technological tradition, the same one represented by the grit-tempered ceramics (eliminating the Nebraska Culture rim sherd) from sites 23 CL 226, 274, and 276. Calabrese (personal communication) argues that these two wares "occurred together and are a product of the same culture, not necessarily made by the same folk. These could be women making different kinds of pottery (i.e., the same women or they could be women obtained from Nebraska culture peoples further upriver and integrated into the Mississippian complex).

That these two wares occur together at a number of sites in the Smithville Lake area is, of course, undisputed. Calabrese's suggestion is an hypothesis which he may wish to test, but one I have not the time to pursue. At present, it is no explanation for the situation we have encountered at Smithville and it is time to consider some additional evidence, that of the radiocarbon assays from site 23 CL 276, before offering our explanation of the combination of the shell-tempered and the grit-tempered wares at this and the other sites at Smithville.

Features 17 and 20, site 23 CL 276, are concentrations of fire-burned limestone fragments which have associated charcoal, some pottery, and little else (see Chapter VIII for a fuller description). Feature 17 is located about midway along the inner side of the north wall of the four-sided structure and Feature 20 is located two to four meters east of the northeast "corner" of the structure. Generous samples of charcoal were recovered from each feature and submitted both for botanical identificaion and radiocarbon age determinations (see Chapter VII for full discussion). Three samples from Feature 17 and two samples from Feature 20 were dated and are tabulated below:

Sample	F.17 Radiocarbon Age	Uncorrected A.D. Conversion
GX-6612	1130 +/- 150 B.P.	A.D. 820
GX-6313	1205 +/- 130 B.P.	A.D. 745
UGa-2714	1220 +/- 135 B.P.	A.D. 730
	F.20	
UGA-2857	1240 +/- 60 B.P.	A.D. 710
GX-6338	980 +/- 125 B.P.	A.D. 970

The three assays from Feature 17 have produced a remarkably tight cluster of determinations and one assay from Feature 20 groups itself naturally with these three. The GX-6338 determination seems to be a bit

out-of-line when compared to the other four, especially when one considers that the tested sample of charcoal was drawn from the same lot that assayed 240 radiocarbon years older (i.e., UGa-2857).

The five dates constitute a prima facie case for there having been aboriginal activity at 23 CL 276 well before A.D. 1000 and consequently well before the Mississippian occupation at this site. As noted previously, there is abundant grit-tempered pottery present among the fire-burned rocks in Feature 20 but only one shell-tempered sherd; these sherds comprised the base and semicontiguous parts of a subconical, cord-marked vessel. Pottery comes from around and in the upper portions of Feature 17; there were no potsherds present in the lower level, the layer of fire-burned rocks, when this was excavated and removed. A grit-tempered, cord-marked lip-decorated rim sherd (No. 1263) from the upper part of Feature 17 is almost certainly from the same vessel as a similar sherd (No. 1087) from a location about 4 m southeast. These distinctive rims cannot be mistaken for Nebraska Culture or Steed-Kisker vessel rim types.

We have gone to rather great pains to classify, describe, and compare the pottery from Sites 23 CL 226, 274, and 276. The two basic groupings, a shell-tempered division and a grit-tempered division, compare closely with groupings made by Calabrese (1969). We have also identified a unique Nebraska Culture rim sherd. We contend that the common grit-tempered ware from these sites and that excavated by Calabrese do not correspond to the grit-tempered pottery from the Steed-Kisker, but rather represents a non-Steed-Kisker cultural component in the Smithville Lake area. Given the radiocarbon age determinations from 23 CL 276, we argue that this component dates to the 8th and 9th centuries A.D., and possibly slightly later. On the basis of the cord-marked, grit-tempered ceramics which we believe represents this component, it can provisionally be classified as a Late Woodland manifestation.

Other data will be subsequently presented and reviewed that will have a bearing on the discussion as to whether or not there is a distinguishable Late Woodland component at 23 CL 276 and the other nearby sites (e.g., projectile point types, distributional information). If we are correct in postulating a Late Woodland presence and series of activities at 23 CL 276 prior to the appearance of the Middle Mississippian groups, the associations of the distinctive ceramics of each substage is understandable. The cultural debris left behind by the earlier settlers was subsequently disturbed and incorporated into the debris of the later settlers. In Chapter VIII, we examine this thesis and present a full analysis of the distributional data at site 23 CL 276.

SUMMARY AND CONCLUSIONS

This chapter has presented a problem-oriented analysis of the ceramics from the three sites, 23 CL 276, 274, and 226. The recognition of the physical distinctiveness of the shell- and grit-tempered potteries which began to emerge during excavation was eventually converted into a working hypothesis concerning different phases of occupation at

these sites, despite the presence of both kinds of wares in many of the same features at each site. This working hypothesis was, basically, that the differently tempered wares represented the activities of human groups from different periods with different ceramic traditions. Our ceramic analysis has confirmed the essential dichotomy between the two wares, a conclusion previously reached by Calabrese (1969). In contrast to Calabrese, I believe that the two ceramic types were not the product of the same social group, that is, the two ceramic types were not made and used contemporaneously.

On the contrary, the grit-tempered pottery and the shell-tempered pottery from sites 23 CL 276, 274, and 226 are the products of different social groups which occupied these loci at different times. No evidence of technological or stylistic continuity can be found in the ceramics of the two groups, i.e., there are no intergrades between them. This discontinuity can best be explained, I believe, by hypothesizing different authorship for the different wares. I suggest that the shell-tempered ware we recovered from sites 23 CL 276, 274, and 226 was made by groups closely related to those who left the similar pottery at other nearby sites in the Little Platte Valley (e.g., 23 CL 109, 113, 118, etc.). These groups, in turn, had a strong affiliation with those occupying the Steed-Kisker type site (23 PL 13) and it is, therefore, logical to speak of a Middle Missippian cultural phase in the Little Platte Valley. The age of the Steed-Kisker episode in the Little Platte Valley is still imperfectly known, but an estimated span from about A.D. 950 or 1000 to 1250 to 1300 seems reasonable (O'Brien 1978; Shippee 1972: 2; Calabrese 1969: 213-216, 219).

For most of the grit-tempered pottery, on the other hand, we suggest only a generalized Late Woodland designation based on its morphological heterogeneity and general similarity to Woodland ceramics in temper, vessel form, and surface treatment. The radiocarbon age estimates from Features 17 and 20, site 23 CL 276, which are A.D. 710-970 (uncorrected for radiocarbon flux), fairly reflect the period of a Late Woodland occupational phase at this site and thus offer support for the Woodland identification of most of the grit-tempered ceramics. These dates will be discussed more fully later in this report, but accepting them at face value for the moment, we can visualize a late Woodland occupation (or series of occupations) in the period from about A.D. 600 to 950 (one standard deviation before and after the three central C14 dates from 23 CL 276). This Late Woodland occupation would have preceded the Steed-Kisker occupation at 23 CL 276 and the other sites, perhaps, by as much as a few hundred years.

Accepting the general correctness of this estimated span for the Steed-Kisker episode and our own calculations for the age of the Late Woodland phase, we conclude that the two (or more) cultural phases represented at the three sites under discussion existed between approximately A.D. 600 and A.D. 1300. Thus, it appears that late prehistoric occupation in the Little Platte Valley crosses a recognized culture-historical boundary, the Late Woodland/Middle Mississippian disconformity.

In short, the requirements (test implications) of the hypothesis posed earlier in this chapter have been met: the heterogeneity of the

ceramic assemblages has been demonstrated; there are some instances of mutually exclusive distribution of the two ceramic classes; the sites from which these ceramics come are likely to have been occupied (not necessarily continuously) over a period of a half a millennium or so, and during which a significant cultural transformation occurred, i.e., the replacement of indigenous Late Woodland ceramics by Middle Mississippian ceramics, reflecting, according to traditional interpretations, the appearance of peoples from the area of Cahokia in the Kansas City area. This hypothesis receives further attention in Chapter IX.

CHAPTER VI

DESCRIPTION AND ANALYSIS OF THE LITHIC ARTIFACTS FROM SITES 226 AND 273-276

INTRODUCTION

This section on lithic analysis is restricted to only those sites which figure in the culture-historical and subsistence-settlement systems interpretations. The justification for the fuller treatment of some materials and the minimal treatment of others derives from the Scope of Work and the research design formulated to guide these analyses. Not all the materials we recovered are pertinent to the chronological, paleoenvironmental, and cultural problems we have been required to investigate. Lithic materials from sites only tested or surface collected are tablated in Appendix E.

OBJECTIVES OF THIS ANALYSIS

Analysis of the lithic materials has been conducted with the following objectives in mind:

1. To provide a comprehensive classification for use in subsequent parts of our analyses and for use by other researchers;

2. To enable us to determine the kinds of activities conducted at the sites, such as:

    a. Chert procurement, utilization, retirement, and disposition patterns;

    b. Subsistence practices;

3. To identify different occupational episodes and culture periods at the sites, that is, to test the hypothesis of separate Late Woodland and Steed-Kisker occupations at these sites.

METHODOLOGY

We are attempting to move from the realm of physical objects (artifacts) recovered through excavation to the realm of determining the functional, chronological, and cultural significance of the objects recovered. To reach our objectives, we have employed a traditional type-based classification system. Classification systems may be developed for specific or multiple purposes. They represent an ordering of the variability present in a body of material in order to obtain data pertinent to research problems under investigation. The morphologically-based classification applied to the lithic artifacts should permit us to distinguish artifacts from temporally different cultural phases. In addition, some typological categories, because of widely

LITHIC RECORDING TECHNIQUES

In the field, projectile points and distinctive tools were generally mapped to the nearest centimeter horizontally and vertically, and separately bagged with pertinent information such as site number, horizontal and vertical provenience, and a short description of the artifact. Other lithic items such as waste debitage were bagged according to excavation unit. After being washed and catalogued, the lithic materials were separated into the broad groupings and categories, e.g., rough rocks, projectile points, other tools, chipped stone debris, etc.

Projectile points were recorded on cards (Figure 6-3) giving: 1) site, 2) catalog number, 3) provenience, 4) general form, 5) metrical attributes, 6) chert type, color, and pattern, and 7) comments about cross-section and symmetry. On the back of each card, the projectile point was sketched for easy visual identification. Other tools were separated according to their morphological attributes, such as degree and location of edge retouch, form, amount of bifacial flaking, etc. Measurements, chert-type determination, and descriptions were made for each.

PROJECTILE POINTS

Chipped stone projectile points form an easily recognized category in spite of the morphological variability among its members. The element all complete specimens have in common is the pointed tip where the converging lateral edges meet. In addition, examples are invariably bifacially flaked and are biconvex in cross-section. Because projectile points need to be haftable, in general, they show some modification that facilitates attachment to a shaft at or near the end opposite the tip. The nature of this hafting modification can range from slight thinning and/or narrowing of the base of the specimen to the production of notches at or near the corners, or along the lateral edges. The patterning in the morphology of this area lies at the base of most projectile point typologies.

Only 35 projectile points come from the five sites under consideration; the more complete, classifiable specimens total 26, and there are 11 fragmentary specimens. We have divided this assortment into 11 categories or subcategories. Initially, this sorting was by intuitive assessment of the morphological variability from which came the recognition that certain specimens "looked" like other specimens and certain specimens were unique (in this collection). The "look-alikes" were provisionally grouped together and examined for consistency in physical and metrical attributes. Those we felt conformed reasonably well to a given physical template were maintained within that particular group, and the others were removed to separate groups. We did not use statistically derived criteria for determining group membership. The whole process is largely subjective and is based on the belief that we can recognize patterning in prehistoric artifacts by visual appraisal and evaluation and can likewise make useful analytical division among

these artifacts by this procedure. The projectile point categories are described below.

Small, triangular points: this category includes those specimens with an isosceles form, straight or slightly convex lateral edges, a narrow base which may be straight, slightly concave, or slightly convex. Members of this category are estimated to fall below 35 mm in length (but none of the longer examples are complete and the maximum length cannot be determined). Four subcategories are; 1) simple (unnotched); 2) side-notched; 3) double side-notched, and 4) side-and-basally notched; a fifth group includes fragmentary notched specimens.

1. Simple (unnotched): two incomplete examples are missing their tips. No. 1488 is fully bifacially flaked and has a slightly concave base. No. 1625 exhibits one fully flaked surface but the opposite side retains the bulbar surface with inverse marginal retouch; this specimen has a slightly convex base (Plate 6-1: a).

2. Side-notched: three incomplete examples, two lack their tips, one part of its base. All three are fully bifacially flaked but a thick node is present between the notches of No. 509. The paired, lateral notches are located 4-6 mm above the base and penetrate only 1-2 mm into the blade. Estimated maximum length of the largest specimen when complete is 35 mm, the shortest about 20 mm (Plate 6-1: e, f, h).

3. Double side-notched: (Plate 6-1: c) a single complete example, No. 1245, of white chert is notched about midway along the lateral edges and again between this notch and the corner of the convex base; the specimen measures 16.8 x 12.0 x 3.0 mm and weighs 0.5 gms.

4. Side-and-basal notched: two specimens, one lacking a basal corner, the other retaining only one corner with one side-notched and part of the basal-notch. Both are fully bifacially flaked and are made from a white or pinkish-white chert. No. 978 measures about 21 x 14 x 3 mm.

5. Fragmentary notched specimens: Nos. 235 and 1687 are well-made specimens lacking their bases but retaining the edges distal to the lateral notches. No. 1687 is made of white chert, No. 235 is made from a dull, grey chert. Specimen No. 1118 lacks the base and retains only part of one lateral notch; it is made of a light tan chert.

Medium, triangular point: a single fragmentary specimen (No. 1627) of dark blue-grey Winterset chert lacks the distal end; the remaining lateral edges are very slightly concave and converging; the base is slightly convex and irregular due to thinning flakes removed from the base. Since this specimen lacks the distal one-third, its complete shape cannot be determined; if it had a pointed tip, it must also have had recurved blade edges (Plate 6-1: cc).

Small lanceolate point: No. 1418 is a very well made, slender specimen of heat-treated, grey to pinkish-grey chert; it lacks one corner and has a straight or slightly concave base. The base when complete was narrower than the mid-part of the specimen; it measures ca. 29 x 11 x 4 mm (Plate 6-1: o).

Simple subtriangular points: two fully bifacially flaked examples exhibit convex lateral and basal edges and subrectangular basal corners. No. 918, made of a greyish-pink chert, is lacking one corner and measures 36 x (28) x 5 mm (Plate 6-1: Z). No. 211, made of a dull pink chert, is lacking one corner and most of its base; it measures ca. (31) x (28) x 4 mm (Plate 6-1: aa).

Small, corner-notched points: this category consists of three subdivisions, designated variants A, B, and C (Table 6-3) which are distinguished on the basis of differences in base-stem-shoulder form and dimensions.

1. Variant A includes three very small examples (Plate 6-1: i-k) characterized by a widely expanding stem-base produced by broad lateral notches inserted perpendicular to the longitudinal axis. The shoulder varies from slightly obtuse to acute, the latter being the case when slight barbs are present. The three specimens range between ca. 19.5 and 28 mm in length and 11.5 and 15.4 mm in width.

2. Variant B includes eight examples (Plate 6-1: p-t, v-x) from the sites under consideration and two from other sites. This group is characteristically a broad, isosceles form with narrow corner-notches directed about 45° to the longitudinal axis producing an expanding stem-base. In seven of nine instances, the base is very slightly concave, in one case each it is straight or slightly convex. Relatively complete specimens range from ca. 25 to 34 mm in length and 21 to 28.4 mm in width.

3. Variant C consists of one example from 23 CL 274, and one from site "Q". This form has a narrow isosceles shape, moderately broad corner notches, widely expanding stems, and slight barbs. The nearly complete specimen is 26.8 mm long (add 1 to 2 mm for the missing tip), 16.5 mm wide. The second specimen is lacking 3-4 mm of the tip and measures 26.7 by 15.9 mm.

DISCUSSION OF THE PROJECTILE POINT CLASSIFICATION

Because of the small number of projectile points from each site and in the composite assortment, statistically meaningful statements are probably not possible. Yet, the small sample allows easy manipulation and comparison of metrical attributes and proportional relationships (e.g., width-length ratios) among the members. These comparisons show that metrical and proportional discontinuities exist between the categories defined on visual and intuitive grounds and thus add credibility to the groupings as representing end-products of patterned prehistoric behavior.

Of the small, triangular specimens, maximum length can be measured or estimated for five; it ranges between 21 and 33 mm. For seven measurable specimens, the maximum width ranges between 11 and 16 mm. Plotting these paried dimensions (Figure 6-1) fails to reveal any clear segregation among these points, unless one were to isolate the longest specimen which is about 6 mm longer than the next longest member.

The small, corner-notched points range up to almost twice the maximum width of the small triangular points but exceed them in maximum length by only 2 mm. Variant A corresponds in size and proportions to the small triangular points and might be the functional equivalent of the latter in a different temporal assemblage. Variant B overlaps with Variant A only in length and is clearly separated from it in width measurements (see Figure 6-1). The width: length ratios [(Width x 100) ÷ Length] of Variant A range from 46-61, and for Variant B, 70-80; there is no overlap between the two, a metrical and proportional discontinuity suggesting possible stylistic or functional differences, or both. Variant C occupies the intervening position but the two specimens (one fragmentary) assigned to this category may themselves represent a distinct grouping as they are slightly longer (on the average) than the Variant A members and are slightly but absolutely wider as well. Table 6-4 indicates that Variant C is closer to A in proportions than it is to Variant B, although visual assessment would place Variant C and B together (Plate 6-1) because of their similar base-stem-shoulder morphology.

In sum, we suggest that the intuitively assessed groupings are empirical ones at least as far as this small sample goes. Whether larger numbers in each category would support the above divisions or not is a moot point. The sample evaluated here, although limited in number, does reveal internal divisions when length-width measurements and ratios are employed. That these categories are real and were actual stylistic and/or functional entities when they were made and utilized is supported by their distribution among the sites (see Table 6-6). Note that Variants A and B of the small, corner-notched points are mutually exclusive in their distribution; the former is found only at site 23 CL 276, the latter only at 23 CL 274. Variant C, which we believe to be close to B in form and length, is represented at site 274, but not 276. All three subcategories of the small, triangular points are represented at both sites, by one specimen each. The potential culture-historical implications of these data will be explored below.

OTHER CHIPPED STONE TOOLS

These are items which feature variable amounts of bifacial and/or edge retouch beyond that caused simply by utilization. This group totals only 77 from the five sites, or 4.6 percent of the lithic debitage. It includes the traditional categories of scrapers, drills, bifaces, gravers, and some lesser categories. Measurements and selected descriptions are given in Table 6-5.

Scrapers: specimens made on flakes or blades that have been generally unifacially retouched to form steep distal and sometimes lateral edges; these trimmed edges are most often convex but are occasionally concave; the bulbar surfaces are usually not modified by extensive retouch (Figure 6-3).

Drills: two micro-sized specimens have broken bit-tips but enough of the bit and base remains to identify them; on each, bilateral retouch on small flakes produces concave lateral edges that converge toward the missing drill tip.

Gravers: two morphologically variable but well-prepared specimens each feature a carefully made tip on a bifacially worked, pointed end; the geometrically-shaped bases are fully modified by bifacial edge trimming (Figure 6-3).

Retouched Flakes and Blades: specimens, sometimes fragmentary, that feature extensive, unifacial retouch along one or more edges (Figure 6-3).

Bifaces and Biface Fragments: a numerous, irregular category consisting of fragments of various types of implements including mid-sections, corner-sections, and bases of knives, preforms, and bifaces, all of which display extensive bifacial flaking (Figure 6-4).

Pebble Chopper: a unique, quartzite pebble with extensive flake removal on one end forming a crude cutting edge; the flake removal is not simply the product of battering as in the case of a hammerstone (Figure 6-4).

PECKED, GROUND, AND ABRADED STONE TOOLS

This small grouping consists of six specimens; they display surfaces modified by the techniques of grinding, abrasion, or pecking. The three categories are:

Milling stones: (N=3; Plate 6-5f) are rocks of small to moderate size which have one or two surfaces ground nearly flat or slightly convex and smooth. Specimen 1305 is a subrectangular mano with two ground and pecked surfaces and a rough perimeter. One face is very flat and the other is concavo-convex. It measures 146 x 123 x 39 mm and weighs 1229.5 gms. No. 1688 is an irregularly shaped pebble with one flat surface displaying some pitting; portions of two adjacent perimeter edges have been modified to remove the original surface. This specimen measures 90 x 86 x 52 mm and weighs 592.5 gms. No. 1393 is a still smaller specimen (71 x 67 x 46 mm; weight 334 gm) which has a red-stained, slightly ground, convex surface; part of the adjacent perimeter edge has been modified to remove the original surface; one definite and one probable plow scar are present on the surface.

Grooved abraders: (N=2: Plate 6-5; Fig. 6-4 b and c); two irregularly shaped specimens of sandstone have a number of narrow and broad grooves. No. 859b is roughly cuboidal (32 x 31 x 25 mm; 30.5 gm), in form and has parallel grooves on each of four sides; the ungrooved ends seem to be

the faces left when the specimen was broken. No. 859a is an elongate specimen (107 x 43 x 25 mm and 98 gm), roughly triangular in cross-section; one broad, V-shaped groove runs the length and a second narrow groove occupies a thickened ridge above the former groove; these two grooves are crossed by a third one, a very broad groove with an almost flat, slightly corrugated bottom.

No. 224 from Feature 2, 23 CL 276, is an unusual specimen in two respects. It is a small angular cobble (87 x 74 x 37 mm; 373 gm) with a single, very smooth, well-polished surface which exhibits faint, parallel striae and dark, patchy stains; an adjacent, angular edge likewise exhibits marked smoothing and dark, shiny patches on the high parts of the edge. The second unusual aspect is the presence of a simple, lightly inscribed geometric design (depicted in Figure 6-5) on the polished surface; the design is partly visible in Plate 6-5b. Whether this specimen should be included among pecked, ground, and abraded stone tools or placed in a separate category, such as "inscribed pebble," is debatable. It is retained in the former because of the clear evidence of abrasion and polishing on the surface and edge, attributes which suggest a utilitarian function for this specimen, something like the rubbing of animal skins, an act that might be expected to impart some organic residue (i.e., the dark patches) to the surface of the implement. The inscription on the functional surface has been partly obliterated through the use of the specimen. No interpretations of the meaning of the inscribed design will be offered, but we recommend close examination of similar ground and polished specimens to determine if comparable examples exist in other collections.

FABRICATION AND UTILIZATION BY-PRODUCTS

This grouping includes seven categories and 1582 specimens of which 1428 are from 23 CL 274 and 276. These categories represent various stages of artifact production, resharpening, or utilization. The defined categories, largely following Faulkner and McCollough (1978), are:

Cores: (N=26) are chert nuclei preserving evidence of the removal of several flakes; the cortex is partly or completely removed, and negative bulbs of percussion and edge battering are present.

Decortication flakes: (N=270) retain a portion of cortex of the core from which they are struck, but reveal no additional edge or surface modification.

Biface thinning flakes: (N=804): each is characterized by the presence of a bulb of percussion, an unmodified bulbar surface, and by flake scars indicating previous flake removals on the dorsal surface.

Flat flakes: (N=224) are small, thin flakes that retain a bulb of percussion and are without cortex on the dorsal surface; they are flakes removed from cores or bifaces.

Resharpening flakes: (N=7) retain part of the worn edge of a bifacial implement, a bulb of percussion, an unmodified bulbar surface, and a

dorsal surface and striking platform with evidence of retouch and earlier flake removals.

Chipping shatter: (N=164) are small, amorphous chunks of chert with jagged, often angular edges with bulbs of percussion generally lacking.

Utilized flakes: (N=87) exhibit edge modification, that is, the removal of small, irregular flakes along various edge segments, induced, we believe, through use.

DISCUSSION OF THE LITHIC DEBITAGE

The tabulation in Table 6-2 reveals some interesting aspects in these assemblages which deserve to be highlighted:

1. Chipped stone implements account for only 4.6 percent of the combined chipped stone assemblage; this figure would be doubled if utilized flakes were included;

2. Fabrication and utilization by-products account for 95 percent of the combined assemblage;

3. Projectile points comprise 35 of 77 (45.5 percent) of the chipped stone implements;

4. Pecked, ground, and abraded implements are represented by a miniscule number (N=6) of specimens, five of which come from 23 CL 276;

5. Sites 23 CL 273 and 275, the low floodplain sites, contribute less than 2 percent of the items to the total lithic assemblage.

Based on these observations, we draw the following conclusions:

1. Sites 23 CL 273 and 275 will have little to contribute to functional or culture-historical discussion (e.g., refining the Steed-Kisker chronology;

2. The preponderance of fabrication and utilization debris will seriously restrict the culture-historical explanations based on lithic remains;

3. Projectile points, because of their frequency as well as morphological distinctiveness, are the best category among the chipped stone implements for culture-historical interpretation;

4. Identification of primary activity areas, that is, places where production and modification processes were conducted, will be difficult or impossible because of the non-primary location of much of the lithic tools and by-products (i.e., in pits and midden deposits).

Another small, corner-notched form we have identified at 23 CL 274 and 276, Variant B, is longer and broader than Variant A. This form may correspond with specimens designated B2x by Wood (1960), and Bla and B2a from the Pomme de Terre Reservoir by Chapman (1954: 38). It seems very close to a provisional type from Delaware County, Oklahoma, called the Guffy point (McHugh 1963: 53 ff., Plate 11). It also approaches some of the Late Woodland points from west central Illinois, especially, the Koster Corner-notched type (Perino 1971: 100). Martin (1976: 40-41) assigns this type to the Late Woodland period in the Fishing River drainage, a few miles southeast of Smithville.

Neither of the projectile point types discussed above (Variants A and B) are reported for the Renner or Steed-Kisker sites by Wedel (1943). These sites, of course, are the classic sites for the Kansas City manifestations of the Middle Woodland Hopewell and the Middle Mississippian cultures, respectively. The Kansas City Hopewell phase lasted for about one-half a millennia at the beginning of the modern era (Johnson 1976: 5). In the Kansas City area, the Late Woodland phase is most securely dated at the Sperry site, 23 JA 85, where a series of three C14 assays place it into the 8th and early 9th centuries (i.e., A.D. 709 to A.D. 827, corrected mean dates; Brown 1979: Table 9.1).

Brown illustrates a series of small, corner-notched projectile points from the Late Woodland component at the Sperry site (ibid., Fig. 9.22), some of which conform to our Variant A (cf. the Scallorn type). Variant B is apparently absent from the Sperry site assemblage. The typical ceramic from the Sperry site is a crushed granite and grog (old sherd) tempered ware with simple rim profiles and medium size orifices (18 to 20 cm inner diameters); vessel shapes are undescribed but there is no indication that they were shouldered forms. Cord-marked exterior surfaces account for about 22 percent of the sample and some of these exhibit external slipping.

Both the C14 dates and the ceramics from the Sperry site are compatible with a Late Woodland cultural designation. Although this cultural manifestation is recognized as being widely represented in the Kansas City area (Johnson 1974, 1976; Martin 1976; O'Brien 1977), its precise chronological placement has, up to now, been largely a matter of ascription and definition; the Late Woodland obviously followed the Middle Woodland (Kansas City Hopewell) and preceded the local Middle Mississippian (the Steed-Kisker). Therefore, the Late Woodland is assigned to the period from about A.D. 500 to A.D. 1000.

The Middle Mississippian affiliation of the Steed-Kisker site has been long recognized. Wedel (1943: 208 ff.) made this clear, although he listed many features of the Middle Mississippian phase which were not in evidence at the Steed-Kisker site or in Western Missouri. He noted that both the ceramics and certain stone tool categories, including small triangular notched and unnotched projectile points, identified the Steed-Kisker site as related to the Middle Mississippian sites to the east.

Examples of these small triangular notched and unnotched projectile points were found at 23 CL 274 and 276, along with generous amounts of the simple, shell-tempered pottery, as well as at other sites in the

DISCUSSION OF THE STONE TOOL ASSEMBLAGES

It is clear that lithic assemblages from the five sites are very impoverished in formalized tools as they are in total remains. In retrospect, this may not be so surprising for 23 CL 273 and 275, the two long-plowed and deeply alluviated floodplain sites. The impoverishment of 23 CL 226 probably results from the mechanical and natural removal of cultural materials and facilities from this site which is located on the sloping end of a hill spur. Plowing and erosion reduced the top soil to a minimum and there was little chance for colluvial buildup, especially after a dirt road was cut through the eastern end of the site. The construction of the stonelined well and other Euro-American activities at 23 CL 276 had an immeasurable impact on the prehistoric contents of the site. Patricia O'Brien was correct when she identified a potential Late Woodland component there, but it is a sparse one.

Sites 23 CL 274 and 276 produced only about 85 tools between them, including projectile points. These tools are spread over 14 categories, but projectile points and bifaces and biface fragments account for the great majority. In all, these two sites produced less than 1500 items of lithic debitage (formal tools, utilized specimens, unmodified items, waste products, etc.). It seems unlikely that we will be able to make any profound, statistically valid generalizations regarding the significance of the variability among these two assemblages. There are so few specimens in most of the categories that identifying specific activities, for instance, on the basis of the distribution of lithic implements seems highly unlikely. We must also recognize that the pedestrian surface of site 23 CL 276 was, at one time at least, cleared of cultural impedimentia (or so we hypothesize; see Chapter VIII for a discussion of this point). This kind of prehistoric aboriginal activity would make very difficult the discovery of discrete functional loci within and in the vicinity of the four-sided structure, especially if it were maintained in a state of tidiness throughout the period of its use.

PROJECTILE POINTS AND THE TWO COMPONENT HYPOTHESIS

The projectile point subassemblages from 23 CL 274 and 276 provide support for the hypothesis that both Late Woodland and Middle Mississippian components are present at these two sites. Table 6-7 identifies points from other Kansas City area sites that have been assigned to the Late Woodland or Middle Mississippian stages and their counterparts at sites 23 CL 274 and 276. A variable series of small, corner-notched points are commonly considered to be diagnostic of the Late Woodland stage in the Kansas City area (Shippee 1967; Johnson 1976; Martin 1976; Brown 1979). One of these point forms from the two sites in question, our Variant A, is elsewhere designated the Scallorn point (Suhm and Jelks 1962: 285; Bell 1960: 84). O'Brien (1977) has employed this designation in the Smithville Lake area. The Scallorn type is one that exhibits considerable variation, especially in blade edge modification (McHugh 1963: 83 ff.).

vicinity (cf. Calabrese 1969: 95 ff. and Fig 2; O'Brien 1977: Fig. 14, and Appendix III, Fig. 11). There can be no questioning the existence of the Middle Mississippian culture groups in the Smithville district and there can be little doubt that they are represented by the ubiquitous triangular points (small, notched or unnotched) and the shell-tempered pottery. A sufficient number of sites of this cultural stage have been excavated and reported on and there are an adequate number of C14 dates from these sites to remove any serious doubt on the presence or approximate age of this manifestation.

What doubts exist concern the presence and age of a bona fide Late Woodland stage in the Kansas City area (Calabrese, personal communication, September 21, 1979). To be sure, sites of this stage are poorly reported and there seems to be a lack of information on this stage in general. No matter what the deficiencies are regarding evidence of the Late Woodland stage in the Kansas City area, it cannot be assumed that it is not represented; that is an hypothesis itself requiring testing. The implicit idea of a population and cultural hiatus for the 6th through the 10th centures A.D. in the Kansas City area seems unrealistic. There exists sufficient evidence in the form of widespread artifact remains and C14 dates to cause rejection of this thesis, although the evidence is not as well documented as one would wish.

In summary, we have made the following points regarding the hypothesis that two components are represented at 23 CL 274 and 276:

1. A Late Woodland component is represented by certain projectile point forms which distinguish it from a Steed-Kisker component, also represented by distinctive projectile points;

2. A Late Woodland cultural stage is manifested elsewhere in the Kansas City area (e.g., Fishing River Drainage, Little Blue River drainage, Brush Creek drainage); theoretically, it should be present in the Little Platte drainage;

3. The Late Woodland cultural episode at one site (23 JA 85 on the Little Blue River in Jackson County) is closely dated to the 8th and 9th centuries A.D.; this site produced grit-and-grog-tempered pottery and non-Mississippian projectile points (Brown 1979);

4. Some projectile point forms from 23 JA 85 have counterparts at 23 CL 274 and 276, but the Sperry site projectile point complex is much more limited in variability than that from the Smithville sites;

5. A Late Woodland projectile point complex is represented in the Smithville Lake reservoir by a few speciments from several sites reported by Patricia O'Brien. For instance, Sites 23 CL 109, 115, and 199 each produced the small, corner-notched Variant B type point (O'Brien 1977: Fig. 14: i and p; Fig. 7: b and c; Appendix III, Fig. 9n).

THE REMAINING LITHIC IMPLEMENTS AND THE TWO COMPONENT HYPOTHESIS

The chipped stone implements, other than the projectile points, provide no independent evidence supporting the hypothesis of Late Woodland and Middle Mississippian components at the sites under consideration. There are simply no finished, chipped stone tools, excepting certain points, that can be considered as diagnostic of either of these two cultural stages. J. Mett Shippee (1972) indicated that (alternate) beveled knives are fairly common on Steed-Kisker sites although he does not cite this form as being diagnostic of this phase. It is the kind of chipped stone tool that would suggest the presence of a Middle Mississippian component at the sites we have investigated, but since it is completely absent from the materials we recovered, the point is rather academic. The scrapers, drills, gravers, abraders, manos and grinding stones, etc., from sites 23 CL 274 and 276 are classes of stone implements that are found in assemblages going back to Archaic times, and it is pointless to try to identify the specific members of these groups as indicative of one or another cultural component.

On the other hand, there is one stone artifact that may indeed be considered diagnostic of one component at 23 CL 276; it is a carved siltstone pipe (Plate 6-5c), now fragmentary and incomplete. The expanded disc-like rim above the narrow bowl compares favorably with specimens from 3 Steed-Kisker sites reported by Shippee (1972):

1. A specimen from House 3, Steed-Kisker site (ibid.: Fig. 12j);
2. The upper part of a specimen from the Shepard Mound which is located 3 miles west of Smithville (ibid.: Fig. 10d);
3. Two specimens from the Vandiver Mound C (ibid.: Fig. 6a & b).

Thus, there is only one lithic item other than projectile points, the stone pipe, that contributes to the identification of either of the cultural components at the five sites reported on here. The fragments of this pipe were found directly outside the west row of postmolds of the large structure at 23 CL 276 and it is presumably related in time to the structure, which we believe was constructed late during the period of Steed-Kisker occupation of 23 CL 276 (see Chapter VIII).

The two C14 dated features from this site (F. 17 and 20) produced no diagnostic stone tools and consequently offer no help in distinguishing the Late Woodland from the Middle Mississippian lithic component. The absence of physically separated lithic assemblages at the sites under consideration has limited the contribution of the lithic analysis to culture-historical interpretations. Nevertheless, support for the two component hypothesis has been forthcoming from the lithic analysis, and we deem that one objective of this analysis has been achieved.

FUNCTIONAL IMPLICATIONS OF THE LITHIC ASSEMBLAGES

It is obvious that any attempts at functional interpretation of the lithic implements from 23 CL 274 and 276 will suffer because of our inability to separate the Late Woodland group from the Middle Mississippian group. In others words, it will not be possible to determine if Late Woodland and Middle Mississippian activities related to the manufacture, utilization, and disposition of stone tools and debris differ from each other in any comprehensive fashion. In fact, the only artifact grouping in which comparisons can be made between the apparently Late Woodland specimens and the Middle Mississippian specimens is the projectile points.

The presence of projectile points at sites 23 CL 274 and 276 indicate the following for both the Late Woodland and Middle Mississippian phases:

1. Points were lost, left behind, or purposefully retired or disposed of;

2. Points were maintained (curated) and perhaps fabricated by groups occupying these sites;

3. Use of the bow-and-arrow since the projectile points conform to Fenenga's (1953) Small Point category, generally conceded to be arrow points;

4. Subsistence activities requiring the bow-and-arrow, such as the hunting of terrestrial mammals and, perhaps, fowling;

5. Social differentiation with the groups featuring individuals, most likely males, who utilized, maintained, and fabricated the elements of the bow-and-arrows.

When other categories of artifacts are considered, the above list can be expanded to include these activities:

6. Domestic activities such as hide preparation and clothing manufacture, if the micro-drills and scrapers are correctly identified for function;

7. Inscribing on some non-plastic material, bone, antler, shell, perhaps even wood, if the implements called gravers are properly designated;

8. Preparation of some kinds of foodstuffs by using the manos and grinding stones;

9. Conversion of animal bone into implements through grinding on the grooved abraders;

10. Reduction of stone and the fabrication of stone implements as is indicated by the by-products of these activities (e.g., cores, shatter, decortication flakes, biface thinning flakes, etc.).

Unfortunately, we cannot determine what differences existed in these activities between the Late Woodland and Middle Mississippian occupations on the basis of the lithic analysis. These basic inferences on the functional implication of the stone tools and debitage must be considered a minimal set deriving from a rather simple, common sense approach. Just as we deduced that males were implicated by the presence of projectile points, women members of the occupying groups are also implicated by certain categories of stone tools, e.g., scrapers, micro-drills, grinding stones, etc. Of course, the evidence for heating and cooking at 23 CL 276 (i.e., the two hearths and the charred grit-tempered pottery in one of them) and the heating or roasting of some substance at 23 CL 274 add support to the thesis of females being present at the two sites.

The fairly common broken bifaces and utilized (use-modified) flakes indicate the immediately local employment of these specimens for some unspecified acts which caused their breakage or edge modification. In all, we can visualize a wide variety of activities taking place at 23 CL 276, especially (of which the above ennumerated items are suggestive), conducted by social groups having both adult males and females. The lithic inventory informs us that these people hunted wild animals for part of their subsistence needs but were also reliant on plant foods. These inferences will astound no one, of course, but nevertheless they deserve to be recorded for they lead the analysis back to the fact that it was human groups who were responsible for the cultural remains recovered from the investigated sites and that the proper interpretation of these remains must involve those human populations.

SUMMARY

In this chapter, we have been concerned with the classification, description, and interpretation of the lithic artifacts from the five sites that form the core of this study. A major objective was to determine if the lithic assemblages could provide evidence either disproving or supporting the two component hypothesis; we conclude that morphological variability among the projectile points is best explained by the hypothesis that they were made by different social groups with different cultural traditions over a period of several centuries. The Middle Mississippian component, strongly documented by the abundant, plain, shell-tempered pottery, is also documented by the small, triangular notched and unnotched projectile points. Another component, widely recognized as being Late Woodland, is documented by a series of small, corner-notched points as well as the presence of grit-tempered, plain and cord-marked pottery.

The remaining categories of lithic implements and by-products cannot be segregated into temporal or cultural taxonomic divisions due to the lack of stratigraphic separation, the mixing of cultural deposits, and the lack of diagnostic types. Simple functional inferences based on the lithic categories allow the interpretation that a moderate variety of activities are registered in the lithic remains, including hunting, plant utilization, hide preparation and clothing manufacture, stone procurement and tool fabrication, etc. Only two stone objects, a

carved stone pipe and an inscribed and polished pebble, suggest other than mundane, utilitarian activities.

The activities implied by the various artifact categories suggest that social groups with adult males and adult females were the agents responsible for the manufacture, use, and deposition of these remains. In particular, the projectile points implicate males and scrapers, drills, manos and grindstones the females. Organizational differences between the groups of the two cultural components cannot be made on the basis of the lithic analysis since only projectile points can be safely attributed to either cultural stage.

CHAPTER VII

ECOFACTUAL REMAINS AND RADIOCARBON DATES FROM SITES 23 CL 226, 274, AND 276

INTRODUCTION

In this chapter we will review the results of the analyses of the floral and faunal remains recovered by GAI in the excavation of three sites. In addition, the radiocarbon assays made on charcoal from two of these sites will be presented and discussed. Methods by which these data were collected will be described and problems encountered during their recovery, processing, and analysis will be detailed. The identifications of the botanical and vertebrate remains by Mrs. Frances King, Illinois State Museum, and Mr. Carl Falk, University of Nebraska, respectively, are presented in separate sections along with their evaluations of these data.

Dr. James King, Illinois State Museum, and Dr. Harold Rollins, University of Pittsburgh, spent short periods in the field with project geologist, George Gardner, in order to appraise the paleoecological potential of the Smithville Lake district and to identify locales and deposits for investigation. As a result of King's visit and subsequent analyses, we learned that some sampled alluvial sediments from in-filled channels were devoid of pollen and most paleofloral indicators. Rollins found that in the selected locales he examined, there was a dearth of terrestrial gastropods and no opportunity for paleogeographic reconstruction based on these kinds of data.

PROBLEM ORIENTATION

The objectives of collecting botanical and faunal remains from the sites investigated were two:

1. To contribute information for use in "a discussion of the paleoenvironment," as required by the Scope of Work; and,

2. To develop data relevant to determining the subsistence modes of the inhabitants of the sites we investigated.

The second objective is limited mainly to the late prehistoric Steed-Kisker and Woodland groups who were responsible for sites 23 CL 273-276 and 23 CL 226. These were the sites designated for extensive excavation and naturally became the focus of paleobotanical and paleofaunal data retrieval and interest. Two other sites (23 CL 229 and 232), also identified as Mississippian sites, were to be test excavated only. Site 23 CL 208 turned out not to be a prehistoric site at all; site 23 CL 226 contained only two in situ features; and sites 273 and 275 were terribly impoverished floodplain sites without any ecofactual remains. Sites 23 CL 274 and 276 were the most productive in terms of prehistoric plant and animal remains recovered, but even these two sites cannot be considered to have produced bountiful quantities of either.

These two sites and the related site (CL 226) all have Steed-Kisker components as well as earlier Late Woodland components. Since we investigated no earlier sites in any detail, our discussion of subsistence modes must be restricted to the latest prehistoric horizons.

The requirement to perform ancillary studies including geological, botanical, and zoological studies, is partly met by the data and discussion presented in this chapter. The geological and geomorphological investigations are detailed in Chapter III.

METHODOLOGY

Excavation tactics were planned from the outset to maximize the recovery of paleo-environmental and subsistence base data. As part of our field equipment, we had a flotation processing unit, an engine-driven pump, hoses and screens, all of which would have permitted our processing samples right in the field. However, after setting up a laboratory office in Smithville, we decided to perform the flotation processing there rather than at the sites under investigation. Consequently, samples were accummulated in heavy-duty plastic bags and transported to the lab where they were processed. The advantages of performing this function in the lab were:

1. There was no loss of man-hours from excavation activities; processing all the samples took one person several weeks following the field work;

2. This work could be done in the comfort of the lab during the early winter where there was abundant tap water, plenty of space for drying the floated samples, and an oven for the final drying of the botanical samples;

3. These samples could be immediately examined, sorted, and bagged according to category of material (e.g., charcoal, charred and uncharred seeds, bones, chert micro-flakes, ceramics, etc.).

The final sorting of the samples was made with the aid of a binocular microscope. This step permitted partially purifying the samples by eliminating extraneous elements such as microscopic "mud-balls" (clay pellets), granules, etc. Not all such elements were removed prior to specialist examination, and fresh seeds were a common component of the samples submitted.

A word concerning the sampling strategy is in order. Sites 23 CL 273 and 275 on the floodplain had extremely limited cultural remains and no features or midden deposits. We took no samples from these two sites because the scant artifactual remains were suspended in an alluvial context disturbed by plowing. Sites 23 CL 274 and 276 produced numerous features and ample samples were taken from most of these. Exceptions are the postmolds which went unsampled. The only two features at 23 CL 226 were sampled. No attempt was made to take controlled samples for paleobiological data from other than identifiable features. However, at site 23 CL 276, a systematic series of soil samples was taken from the

ground below our lowest excavations for the purpose of ascertaining the soil pH and potassium content.

ARCHAEOBOTANICAL REMAINS

Table 7-1 summarizes the archaeobotanical remains from the three sites under consideration, and Table 7-2 presents their distribution by feature. The uncarbonized and fresh seeds identified by Ms. King have not been included as she considers them to be recently introduced (e.g., by ants, etc.).

It needs to be mentioned here that wood charcoal was submitted for identification only when we thought the quantity was large enough to be identified. Features 17 and 20, the two hearths of site 23 CL 276, produced large amounts of charcoal, but none of the others did. In volume, the feature deposits varied considerably, but since we did not record the weights or volumes of material processed by flotation, we cannot quantify this attribute.

The carbonized seeds represent four genera or species, Zea mays, Iva annua (marshelder), Chenopodium sp. (lambsquarter), and Prunus americana (wild plum). Maize is represented by 9 kernels (or fragments) from 4 features (F. 5 and F. 16 at Site 23 CL 276, F. 101 at Site 23 CL 274, and F. 201 at 23 CL 226)). The latter two produced shell-tempered potsherds almost exclusively, and the former two contain both shell- and grit-tempered sherds. All these features are attributed to the Steed-Kisker phase occupations of these three sites. It should be noted that no maize kernels were recovered from Features 17 and 20 at 23 CL 276; these two features have been C14 dated to A.D. 700-1000 (see below). On this evidence, it may be inferred that corn was probably cultivated during the Middle Mississippian occupation at Smithfield, but the evidence fails to support the practice of maize cultivation during the Late Woodland period.

At site 23 CL 274, the complex of features 101-106 has produced 11 marshelder (Iva annua) seeds or achenes, 12 lambsquarter (Chenopodium sp.) seeds, and 2 maize kernel fragments. We consider it likely that these features represent a facility (see Chapter VIII) in which some substance was heated, roasted, or baked. The concentration of the above named seeds makes the identification of this complex as a seed-parching or a food-roasting facility an attractive hypothesis, one which will be explored in Chapter VIII when the site 23 CL 274 is discussed at length. The presence of small quantities of hickory shell fragments in these same features may indicate that these nuts were also being roasted or the shells themselves were being used as fuel. Hickory charcoal was recovered from F. 101 and small amounts of oak, elm, hickory, and mulberry charcoal were recovered from F. 107, located ca. 3 meters east of the 101-106 complex; F. 107 may have been a dump for exhausted fuel from the facility represented by Features 101-106.

The concentration of plant seeds in the features at 23 CL 274 is not repeated at 23 CL 276 where only Feature 16 contained more than 1 seed remnant. Preservation and sampling vagaries are surely factors of

unknown importance in explaining the distributional data on plant remains at these sites. Nevertheless, since we processed a much larger volume of feature contents from 23 CL 276 than from 23 CL 274, we feel that the difference in recovered plant remains represents real functional differences between the features of the two sites.

Frances King recorded the length and width of measurable Iva seeds and achenes from 23 CL 274 and these data are given in Table 7-3. She notes (personal communication, 4 April 1979) that these specimens average 4.2 mm for achene length and 2.5 mm for achene width. Allowing for a 10 percent reduction in size from the fresh condition, these values can be increased to 4.7 mm and 2.8 mm respectively. In length, this value falls between that for wild Iva annua (2.5-4.5 mm) and that for domestic Iva (4.8 mm and greater) (Yarnell 1972: 335-341). Iva seeds from the nearby Friend and Foe site, 23 CL 113 (Calabrese 1969) averaged 5.5 mm in length and 3.7 mm in width, according to King (ibid.). She concludes that the Iva seeds from 23 CL 274 and 276 are probably from wild plants, but notes that they do fall within the range of those from 23 CL 113.

Whether wild or domestic, it is clear that Iva annua was being collected and utilized by the group responsible for the Feature 101-106 facility. The same argument applies to the presence of Chenopodium sp. Since, Chenopodium is "a weed adapted to disturbed areas such as those around archaeological sites," it may be an accidental inclusion in these features but, given the presence of both corn and Iva in the same feature, King thinks it is likely that Chenopodium was being collected and used (King, personal communication, 17 and 18 April, 1979).

In addition to reporting the recovery of Iva annua from 23 CL 113 (the Friend and Foe site), Calabrese (1969: 155 ff. and Table 22) notes the presence of abundant corn, pawpaw (Asimina sp.), pigweed (Amaranthus sp.), serviceberry (Amelanchier sp.), pokeweed (Phytolacca sp.), sunflower (Helianthus annuus), and squash (Cucurbita pepo). The pokeweed and wild sunflower seeds are not carbonized and are considered to be possibly due to recent admixture. Chenopodium sp. is not positively identified, but black walnuts, hickory nuts, and hazelnuts are. Discounting the weed species, 23 CL 113 differs from sites 23 CL 274 and 276 in the presence of squash, pawpaw, and serviceberry, and in the absence of Chenopodium and wild plum (Prunus americana). It is unwarranted to make any profound statements regarding these differences given the very different nature of the sites and their different preservation characteristics. This point is emphasized by the contrast in the abundance of corn (Zea mays) found at 23 CL 113 and its scarcity at 23 CL 274 and 276. Because maize was stored and utilized in the residential structures at 23 CL 113 and these structures collapsed upon burning, maize was preserved in abundance. The structure at 23 CL 276, very different from the houses at 23 CL 113 and presumably used for different purposes, never burned; thus, for both functional reasons and differences in preservation characteristics, these sites vary considerably in the quantity and quality of botanical remains recovered.

Arboreal Species and Genera

The tree species and genera represented by nut shells and charcoal have been listed in Table 7-1. There are no surprises on this list, and, as Frances King notes, "All of these taxa might be expected to occur on the terrace or adjacent slope and all are important members of the floodplain and slope forests of northwestern Missouri" (personal communication, Feb. 1, 1979). Her comment does not cover persimmon, popular or willow, honey locust, mulberry, or hackberry, which had not been identified among the charcoal at that time. Mulberry and hackberry are understory species of the mature floodplain forest of the Missouri River and poplar and willow are early residents on floodplain deposits (Munger et al. 1974: 916-933). Persimmon and honey locust are minor species of this floodplain-slope-uplands arboreal complex. Mrs. King informed me that persimmon is a species that grows on disturbed ground; such conditions might be expected to exist around the sites where prehistoric aborigines were dwelling and practicing cultivation.

King's identifications document the existence of an expectable suite of arboreal species for the Little Platte River valley for the period from ca. A.D. 700 to A.D. 1300. With the data at hand, we are unable to determine if any changes in the arboreal complex occurred during this period. Treating the data as being representative of the entire period, we suggest, on the basis of the arboreal species identified, that bioclimatic conditions during these six centuries was not appreciably different from those of the past century and a half.

Of the charcoal submitted for identification, that from Features 17 and 20, 23 CL 276, is the most abundant and most securely dated (see below). Of 195.0 grams of charcoal from these two features examined by Mrs. King, only mulberry and walnut are missing from the list of genera or species in Table 7-1. An interesting point emerges if one examines the percentage composition of the various genera represented in the charcoal; these data are presented in Table 7-4. Almost 45 grams of the 195 grams are unidentifiable (22.97%). Of the remainder, hickory accounts for the greatest proportion (41.48%), with oak next (27.1%), followed by persimmon (14.51%), and elm (13.58%). Of all the genera represented, persimmon, honey locust, hickory and oak have the highest heat values (96%, 94%, 93% and 83-92%, respectively, comparing one cord of wood to one short ton of bituminous coal; Graves 1919).

The data of Table 7-4 lead us to infer that the people who were responsible for the two hearths (F. 17 and 20) may have been purposefully selecting certain hardwoods for fuel, but not indiscriminately. Thus, for instance, walnut is absent from the charcoal although it is present in the form of nut shell fragments. Perhaps walnut trees were relatively rare, or were recognized as more important as a source of food than as fuel. Mrs. King suggests that firewood is likely to be collected relatively close to the residences, whereas food (e.g., walnuts) would be gathered over a much larger area.

Sites 23 CL 274 and 276 sit on a ridge about 180 to 220 m from and 9 m above the river bank. A gentle hillslope lies immediately west and southwest and a tributary stream valley immediately northwest. Given the proximity of these different physiographic zones, we can assume a

diverse arboreal vegetation existed quite close to the two sites. The charcoal present in Features 17 and 20 may reflect the composition of the forest within a certain distance of the site. However, the large proportions of hickory and oak among the charcoal, the lesser but still substantial proportions of persimmon and elm, and the paucity of softwood species, might indicate the preferential selection of the long-burning hardwood species by the inhabitants who made the two fires.

The foregoing interpretation must be tempered, however, with the following caveat. Frances King points out that the relative proportions of hardwood and softwood species found in the hearth charcoal may inaccurately reflect the proportions present before burning. Hickory charcoal, she says, would be preserved to a much greater degree than would charcoal of fast-burning cottonwood or willow. If they were equally present at the start, hickory would probably dominate the charcoal remaining at the end. We are thus left with the tantalizing possibilities that seem apparent in Table 7-4 and a lack of the means to test them. Unfortunately, this is not a moot question. The matter of whether wood was selected on the basis of its relative availability near the places it was burned, or whether certain genera were selected because of certain qualities (i.e., slow-burning, high heat values, etc.) are questions that have implications both for human behavior patterns and for building models of prehistoric environmental conditions. All we dare say about the native vegetation present in the Little Platte valley during the occupation of the sites we investigated is that the genera listed in Table 7-1 were present and were being exploited when the sites were occupied.

RADIOCARBON DATES FROM SITES 23 CL 226 AND 276

The charcoal samples selected for radiocarbon age determinations met the following criteria:

1. They were generous samples of wood charcoal that could be divided into two or more datable samples;

2. They were from discrete cultural units, specifically, two hearths and one trash-filled pit;

3. The charcoal was identifiable as to genera represented.

When charcoal was encountered during excavations, it was carefully exposed and removed to foil pouches on which an appropriate label had been written. Our operational premise was that any charcoal was worth preserving. In the laboratory, charcoal was dried in a small oven, sorted through to remove obvious contaminants, and repackaged in fresh foil packets. Six samples were submitted for radiocarbon dating, 5 from 23 CL 276, one from 23 CL 226. Table 7-5 presents the data on the sample proveniences, their C14 ages (using both 5570 and 5730 year/half-lives), and several conversions to their A.D. equivalents. The latter data were interpolated from the tables prepared by H. McKerrel (1975: Appendices IA and IB).

Because of fluctuations in atmospheric C14 over time, as determined by the study of Giant Sequoia and Bristlecone Pine, it has become apparent that radiocarbon years do not correspond precisely to calendar years. Thus, C14 age determinations need to be corrected in order to give a more accurate calendar date. This correction is generally accomplished by using one or another of the charts or tables that attempt to calibrate radiocarbon ages with a dendrochronologically derived time scale. Unfortunately, there is some disagreement as to the magnitude of the corrections needed to convert radiocarbon ages to calendar dates. These disagreements, however, do not have an important impact on the interpretations of the C14 dates from the two sites under consideration.

The single determination from Feature 201, 23 CL 226, is 385 +/- 115 B.P. (UGa-2715). This feature, filled with numerous sherds of the shell-tempered Platte Valley ware, is attributed to the Steed-Kisker phase and should date between about A.D. 1000 and A.D. 1300. The C14 age on charcoal from this trash-pit is much too recent; a date in the 15th or 16th centuries is simply incompatible with other evidence for the age of the Steed-Kisker complex. We have no explanation for this clearly erroneous date, since there was no evidence of mixing or historic intrusion into Feature 201.

Four of the five C14 dates from 23 CL 276 form a very tight cluster whose outer limits are 110 radiocarbon years. Three of these dates come from Feature 17, a hearth within the four-sided structure; these dates are 1220, 1130, and 1205 years ago (calculated using the 5570 year half-life). The fourth date in this cluster is from Feature 20, the hearth outside the northeast corner of the structure; it is 1240 years B.P. These four radiocarbon dates convert to A.D. equivalents, using the 5730 year half-life, of 693, 786, 710 and 673. When corrected by one or another calibration system, these dates fall into the 8th and 9th centuries A.D. (see Table 7-5). These dates on charcoal from the two hearths are indicative of the period when a Late Woodland occupation existed at 23 CL 276; they are too early to be attributed to the Steed-Kisker component.

The fifth date from 23 CL 276, and the second from Feature 20, is 980 +/- 125 years B.P., or A.D. 941 using the 5730 year half-life. It converts to an early 11th century date when the calibration tables are used. Although not too late for a Late Woodland feature, the 260 radiocarbon year difference between this determination (GX-6638) and the older one from Feature 20 (UGa-2857) is unsettling, especially considering the fact that the two samples were in fact part of a larger sample collected from one small locus in the hearth. Because Feature 20 contained some very thick, grit-tempered, cord-marked body and basal sherds of Late Woodland style, the earlier date from this feature seems the more appropriate of the two.

Four radiocarbon determinations by two laboratories (Geochron and the University of Georgia) provide solid evidence for the presence of cultural activity at 23 CL 276 during the 8th and 9th centuries A.D. (ca. A.D. 720 to A.D. 860). These activities involved the construction of fires in rock-lined hearths and the use of grit-tempered vessels. This episode or episodes are attributed to a Late Woodland occupation on the basis of the C14 dates and diagnostic pottery. A single date of ca.

A.D. 1000 to 1030 (calibrated) from one of the Late Woodland features is somewhat out of line but could conceivably indicate the terminus of the Late Woodland occupation.

Unfortunately, no samples unequivocably associated with the Steed-Kisker component features at 23 CL 276 were recovered and we are left without any radiocarbon determinations of the age of this cultural manifestation at this site. The single determination from site 23 CL 226 of 385 +/- 115 C14 years ago is simply too recent by far to apply to the sherd-filled Steed-Kisker pit. We are thus left without any new determinations for the age of the Steed-Kisker component in the Smithville Lake district.

Previously published determinations for this phase at the Friend and Foe site (23 CL 113) place it in the 10th and 11th centuries A.D. (Calabrese 1969: 62). Calabrese rejects one date from this site (GaK-1995, 1190 +/- 80 B.P.) because it falls outside the 130-year standard deviation of the three clustered dates and because the early date "falls during a period where, for each radiocarbon year, there occurs more than one calendar year" (ibid.: 63). Converting the 1190 B.P. date using the calibration tables gives the equivalent of about A.D. 790, which falls exactly at the center of our calculations for the Late Woodland presence at 23 CL 276 (see above). Calabrese was justified in rejecting this date as being applicable to the Steed-Kisker occupation at 23 CL 113; it is, however, possible that it applies to an earlier Late Woodland component at that site which is manifested by the grit-tempered Unnamed Ware (see Chapter V).

O'Brien (1977: 52, 82, 92) has obtained a number of radiocarbon determinations from several sites in the Smithville Lake district. They are tabulated below.

Site 23 CL 108, the Chester Reeves Mound:

UGa-1149	995 +/- 70 B.P.	A.D. 955*
UGa-1200	920 +/- 70 B.P.	A.D. 1030*
UGa-1201	980 +/- 65 B.P.	A.D. 970*

Site 23 CL 109, the Richardson Hulse site:

UGa-1445	Feature 4	865 +/- 70	A.D. 1085*
UGa-1446	Feature 5 (#1)	1260 +/- 90	A.D. 690
UGa-1447	Feature 5 (#2)	835 +/- 75	A.D. 1115*
UGa-1448	Feature 6	659 +/- 100	A.D. 1255*

Site 23 CL 199, the Yeo site:

UGa-1449	Feature 2	1850 +/- 100	A.D. 100
UGa-1450	Feature 1	915 +/- 165	A.D. 1035
UGa-1452	Feature 4	1020 +/- 295	A.D. 930
UGa-1453	S. dozer cut	1185 +/- 65	A.D. 765

Of these determinations, O'Brien believes those with asterisks are unquestionably assignable to the Steed-Kisker phase. Despite the range of C14 determinations for the Yeo site, O'Brien (1978: 52-53) identifies it as a late Kansas City Hopewell site on the basis of the preponderant sand-tempered pottery. Thus, all the dates from 23 CL 199 save the A.D. 765 determination are discarded. In addition to a Steed-Kisker component at 23 CL 109 (with three associated C14 dates), O'Brien (1977: 60) also recognizes a possible Late Woodland component in the grit-tempered pottery. The A.D. 690 determination could easily accomodate the Late Woodland component.

The radiocarbon dates assigned by O'Brien to the Steed-Kisker complex range from A.D. 955 to A.D. 1255. These values would be slightly earlier had the 5730 half-life been used in their calculation; they would be moved closer in time if corrected by the calibration tables. There is good separation between this group of dates, attributed to the Steed-Kisker phase, and the three dates from Feature 17 and one from Feature 20, Site 23 CL 276, which we attribute to a Late Woodland episode.

In summary, the Steed-Kisker occupation of the Smithville Lake district probably began in the late 10th or early 11th centuries A.D. and continued for two centuries or so, if the existing radiocarbon determinations are properly interpreted. An earlier Late Woodland occupation in the same area preceded the Steed-Kisker phase by more than two centuries as radiocarbon determinations from several sites seem to indicate. Whether or not there was a cultural hiatus in the Smithville Lake district between the Lake Woodland and Middle Mississippian Steed-Kisker phases cannot be answered for certain on the basis of the existing radiometric chronology.

ARCHAEOZOOLOGICAL REMAINS

The faunal remains from the sites investigated by GAI are disappointly sparse and fragmentary. Table 7-5 presents the summarized distribution of these remains. Carl Falk, University of Nebraska, made the identifications and the tabulations are from his report. The remains are discussed by site below.

Sixty-five specimens including 55 osteological fragments and 10 fish scales were recovered at site 23 CL 226. All but one come from Features 201 and 203; the other is from the surface and is a tooth of a

domestic pig. Unfortunately, shells from these features were considered to be in such a poor state of preservation as to preclude identification. Mammalian remains comprise 83 percent of the entire sample and fish remains the rest. One identifiable prehistoric taxon is Cyprinidae, a minnow represented by a single vertebra from F. 201, and perhaps the fish scales. Two specimens from F. 201 are identified as belonging to the taxon Odocoileus sp. (deer). A third specimen also attributed to this taxon by Falk is removed from this site and reassigned to 23 CL 276 because of its catalog number (692).

Forty-seven pieces of unmodified vertebrate remains were recovered from site 23 CL 274, 43 of them from Features 101-106, most from the latter. All are mammalian remains but none are classifiable as to family or genus. Falk describes the samples from both 23 CL 274 and 276 as consisting "primarily of small fragments of compact bone; over 62 percent (136) of these were partially or wholly calcined."

One hundred and seventy-three specimens from 23 CL 276 come from 7 provenience units; 139 come from Feature 2, the large midden outside the southwest corner of the four-sided structure. Non-mammalian remains include 3 avian specimens and 23 amphibian pieces. The latter represent Bufo sp. (toads), probably not contemporary with the prehistoric cultural deposits. The eastern cottontail (Sylvilagus cf. floridanus) is probably represented by one first row phalanx from Feature 2. Twenty-two tooth fragments, one left distal humerus, and one left intermediate carpal are probably those of Odocoileus sp., the white-tailed deer, according to Falk.

After briefly reviewing the archaeozoological results of earlier investigations at Smithville (Riley 1967; Calabrese 1969; O'Brien 1977), Falk concludes with the following two paragraphs:

> All identified remains represent essentially modern forms which are found within the general project area today. Both terrestrial and aquatic communities are represented by deer and fish remains respectively. Materials examined are not inconsistent (qualitatively or quantitatively) with materials reported by previous investigators. Sites within the Smithville project area simply do not (or have not, to date) produced large, or even moderate, quantities of faunal material. Preservation seems primarily a function of selective burning -- particularly for smaller animal forms.
>
> Consideration of vertebrate remains recovered from sites included within the present report does little to confirm or refute general statements concerning past procurement behavior offered by previous investigators (e.g., Calabrese 1969) nor does it move us much closer toward an understanding of the role of vertebrate resources in the prehistoric subsistence economies of the Smithville area. Such an understanding must await development of more detailed, testable models and the identification and sampling of contexts likely to produce information useful for evaluation of such models.

The Nature and Distribution of the Vertebrate Remains

Falk characterized the vertebrate remains as consisting of small, fragmentary pieces of compact bone, most of which were calci ed (burned). From the three sites (226, 274, 276), 203 osteological elements (73.8 percent) come from only 3 features (F. 2, F. 106, and F. 201). The Bufo sp. elements from F.2 have been excluded from these calculations as have the 10 fish scales from F. 201. From the three sites, only 32 (12.2 percent) specimens come from other than features.

The fact that all these specimens are small and fragmentary suggests that their comminution preceded their final deposition although the specimens in F. 106 were probably calcined *in situ*. It seems unlikely that bone fragments served as a major source of fuel for the F. 101-106 facility; if that were the case, it would be reasonable to expect the recovery of moderate to large size elements rather than just the minute specimens encountered. The exact significance of the fragmentary, calcined bones in F. 106 cannot be ascertained, but it seems reasonable to suggest that they are there because of the non-intentional incorporation of osteological scraps along with chert debitage in the construction of the facility represented by F. 101-106.

The osteological specimens present in F. 2 parallel in frequency the abundance of potsherds. As this midden is the final repository of these materials, they must have achieved their final size prior to their incorporation into the fill of this feature. Obviously, these materials came from elsewhere and we believe that they were derived from the general area of the four-sided structure. The presence of only one osteological specimen in F. 17 and none in F. 20, Site 23 CL 276, is puzzling, but probably reflects their absence in the original facilities rather than their loss through decomposition since the hearths were last used.

During the later part of the excavations at 23 CL 276, we questioned what the soil conditions might be in regards to the preservation of organic remains. Consequently, we took a series of soil samples systematically distributed across the site, sampling both the culturally barren areas as well as some of the major features. Of the 54 soil samples taken, 8 were submitted for determination of pH value and the total phosphate content. The latter value is unvariable for all 8 samples at <.0001 percent. The pH values vary from 5.2 (quite acidic) to 7.3 (slightly alkaline). The pH values for each sample along with the sample provenience are given below.

Samples 20 and 49, located 4 and 3 meters south and north of the four-sided structure, respectively, give the lowest pH values (5.2 and 5.4). This is a very acidic soil pH and may be considered the natural value for the loessial soil of the ridge. All the samples from within the structure have higher pH values, and the samples taken from below the bottom zone of the three features have the highest pH values of all, 6.7 to 7.3. The generally acidic nature of the soil at 23 CL 276 helps explain the paucity of preserved organic remains observed at this site outside the discrete, debris-filled features. The high pH values from

below Features 2, 17, and 20, indicate the very different pH environments that must have existed in these features. These conditions were more conducive to the preservation of organic remains as the concentration of osteological fragments in Feature 2 indicates. The generally acidic nature of the soil environment at 23 CL 276 is displayed in the Middle Mississippian pottery; the shell-tempering has been invariably leached from the sherds, even those from Features 2, 17, and 20. It seems likely that all the leached pottery must have experienced generally acidic conditions which caused the depletion of the shell-tempering prior to their incorporation in the more neutral features. Interestingly, the Platte Valley ware sherds from Feature 201, 23 CL 226, have retained much of the shell-temper, which is visible both within the core and at the surfaces. These were probably deposited in this pit immediately upon breakage, and may have been broken where we found them.

Sample No.	Provenience	pH
5	Below Feature 2	6.7
18	N873.7, E288 (South central part of the structure)	5.6
20	N869, E288.5 (South of structure)	5.2
31	N877.5, E283.8 (West central part of structure)	6.1
38	N879, E287.9 (North central part of structure)	5.8
49	N884.3, E287.8 (North of structure)	5.4
51	Below Feature 17	6.9
57	Below Feature 20	7.3

SUMMARY AND CONCLUSIONS

The ecofactual remains from the sites investigated by GAI Consultants are sparse because soil conditions and prehistoric human behavior patterns were detrimental to the preservation of paleobotanical and paleozoological materials. The remains recovered from a number of features show evidence of reduction and alteration before they were included in these deposits. For instance, bone fragments from Feature 2, 23 CL 276, are small and often calcined, attributes that must have been acquired before they found their way into this feature, a dump for the debris cleared from the locus of the four-sided structure. The generally acidic nature of the soil at the 23 CL 276 locus has also been detrimental to the preservation of osteological remains.

Manual excavations in three features produced good samples of charcoal from which 6 C14 age determinations have been obtained. Four dates pertain to a Late Woodland occupation in the 8th and 9th centuries A.D. at site 23 CL 276; a fifth date from this site is ambiguous. The single C14 date from site 23 CL 226 is entirely too recent to be applicable to either prehistoric component present at the site. Specialist identification of the paleobotanical remains (charcoal, charred seeds) recovered from various features indicate no major differences in the quality of arboreal vegetation between the prehistoric period(s) the sites were occupied and the recent past. Hardwood species with high heat values predominate in the charcoal obtained from the two fireplaces at 23 CL 276.

Native plants exploited for their food value, as determined by the identification of nut shell fragments, nut meat, and seeds, include: walnut, hickory nut, hazelnut, marshelder, lambsquater, and wild plum. The presence of maize (Zea mays) along with marshelder and lambsquarter in Features 101-106, site 23 CL 274, support the hypothesis that the facility represented by these features was employed for the heat-treatment of some substance, most probably, foodstuffs. This facility is attributed to the latest prehistoric occupation of 23 CL 274, the Steed-Kisker Middle Mississippian phase on the basis of the predominant ceramic type present there. The incorporation of maize into the cooking facility at this site is in keeping with the presence of abundant maize at site 23 CL 113, a short distance to the southwest of 23 CL 274. Our data therefore provide further support for the hypothesis that maize cultivation was a major component of the Steed-Kisker economic base in the Little Platte valley. In addition, it appears certain that the collection of the seeds of certain native plants (Iva, Chenopodium) supplemented the harvesting of cultigens during this same phase.

The vertebral remains recovered are disappointingly sparse and largely undiagnostic as to species represented; they allow no important insights into the procurement patterns of the prehistoric populations responsible for the sites we investigated. It is inadvisable to attempt to characterize the importance of hunting and fishing in the economic systems of the Late Woodland and Middle Mississippian groups in the Little Platte valley; the deficiencies of the present paleozoological evidence pertinent to this topic are simply too great to overcome.

CHAPTER VIII

SITES 23 CL 274 AND 276: TWO NEW STEED-KISKER SETTLEMENT SYSTEM COMPONENTS

INTRODUCTION

Sites 23 CL 274 and 276 have previously been identified as unusual. They are unusual in comparison to other reported sites in the Kansas City area and over a much broader area as well. The unusual nature of the two sites became apparent during their excavation, and, consequently, the four project consultants (Calabrese, Henning, Johnson, and O'Brien), Corps of Engineers representatives (Comstock, Avery, Grosser), and the state archaeologist (Weichman) were all induced to examine them during the period of their excavation. The term "house" was often employed to label the four-sided structure implied by the rows of postmolds at 23 CL 276. We have become increasingly reluctant to use this term, because of its domestic and social implications and a lack of correspondence between it and the "classic" houses in the Eastern Plains and Mississippi Valley. We shall employ the terms enclosure or structure for this facility. The small, intense clusters of baked earth and clay at 23 CL 274 generated less excitement among these observers and also fewer positive identifications.

The laboratory analysis of the contents of the enclosure and its associated features (hearths, refuse pits) and the baked earth clusters soon became intimately related with the ceramic analysis for we thought that the latter might provide a means for the temporal ordering of some of the constructional and depositional episodes which created the two sites' features. Basic to the use of the ceramics for these purposes is the hypothesis developed in Chapter V that the two wares (grit-tempered and shell-tempered) represent different occupational phases at the site. A recognized problem here is the possibility of using the distributional data to test the hypothesis, and finding it "proven," using the newly demonstrated "truth" to explain the distribution of the ceramics. We shall attempt to avoid this pitfall. Some of the results of the analysis presented in this chapter have already been anticipated in Chapter V.

Using both vertical and horizontal distributional data from 23 CL 276, particularly that provided by postmolds, features, and pottery, we shall attempt to outline the chronology of events that resulted in the formation and partial destruction of components of this site. In the absence of stratigraphically separated cultural remains, this chronology can only be considered provisional. However, given the unusual nature of the site, this provisional chronology takes on additional potential significance if it contributes to clarifying the occupational episodes at the site and to an explanation of the formation and purpose of the four-sided structure. A brief excursion into prehistoric aboriginal "metrics" derived from postmold spacing is offered in a purely descriptive fashion.

Although both 23 CL 274 and 276 are multi-component sites, analysis and comparison of the artifactual remains have permitted identifying the

probable cultural affiliation of their unusual structures; they are assigned to the Steed-Kisker Middle Mississippian phase. The ceramic and lithic artifacts of both sites have already been described and discussed and both figure in the interpretations of the age, cultural affiliation, chronology of events, and functions of the two sites. Botanical remains and C14 dates will also enter into the question of the function, age, and cultural affiliations of the sites. Because of the unusual nature of the Steed-Kisker components at both sites, this chapter will present in detail the data which form the basis of our interpretations and the comparisons which demonstrate the uniqueness of the two sites. Finally, functional interpretations of both sites will be offered. Discussion of the place of these two sites in the Steed-Kisker settlement system will be postponed until Chapter IX.

LOCATION AND SETTING OF SITES 23 CL 274 AND 276

The location and general setting of these two sites have been given in Chapter IV, where the locale of sites 23 CL 273-276 was described. Here, a more precise description of the setting of 23 CL 274 and 276 will be presented. They occupy a NNE-SSW trending ridge located 180 to 220 m west of the Little Platte River, south of State Route W (Figure 4-1). This gently rounded ridge is the eastern terminus of the hills and uplands on the west. A ravine carrying an intermittent stream defines the ridge along its northwestern and northern margins. The ridge rises quickly from the floodplain on the east to an elevation of 843.5 feet M.S.L., some 30 feet above the river bank. The two sites are about 180 m apart and a shallow saddle separates them. In short, the loci of the two sites are elevated well above the floodplain and the highest recorded floods, provide excellent stations overlooking the river and bottomlands to the north, east, and south, afford easy access to the main and a tributary stream, and a good view of and access to the rolling uplands to the west.

At the turn of the century, a rock-ledge existed where State Route W crosses the Little Platte River over the Miller Bridge (Frank Miller, personal communication). A rocky-bottomed ford (Swan's Ford) was located about 2 km to the south, and another ledge spanned the river about 2.5 km to the north at Ross's Mill. These and similar features would presumably have been present in prehistoric times to facilitate crossing the Little Platte by the aboriginal occupants of the area. The local terrain and drainage system would have posed no major difficulties for aboriginal travel in the Smithville area.

The legal descriptions of the two sites are:

1. 23 CL 274: NW/4, SW/4, SE/4, Township 53N, Range 32W, Section 7;

2. 23 CL 276: SW/4, SW/4, SE/4, Township 53N, Range 32W, Section 7.

Both are located in northern Clay County, Missouri. A point midway between the two sites is at Latitude 39° 24' 46" N., Longitude 94° 32'08" W.

SITE 23 CL 274

Field Techniques

Our discovery of site 23 CL 274 was due to the northward extension of the vegetation clearing approach we had employed to locate sites 23 CL 273 and 275 on the floodplain to the south and 23 CL 276 on the ridge to the south. We were informed that the field where 23 CL 274 is located had been in pasture before being acquired by the Corps of Engineers. Dense, tall weeds covered the area when we began work there, necessitating the extensive vegetation removal. Excavations at this site were conducted concurrently with those at 23 CL 276, 180 m to the south, mainly in September and October, 1978. We returned to complete the excavations of three features in May, 1979.

The clearing operation exposed some darkly stained areas, baked earth, and other cultural debris, which identified the locus of the site. A grid of 2 m by 2 m squares was erected over the site west of the north-south baseline. Leaving 20 cm wide balks (10 cm wide along the edges of each square), 14 contiguous 2 m by 2 m units were excavated, initially by shovel-slicing, and subsequently by troweling (Plate 8-1). A number of semi-discrete features (designated F. 101, 102, 103, and 104) were defined by concentrations of fragments of baked earth in excavation units N1054-1056, E356-358 (Figure 8-1). A narrow east-west trench was excavated along the N1053.9 line, leaving a wall in which a concentration of baked earth fragments was visible below the lower limit of the plowzone where it hadn't been removed by the scraper (see Figure 8-1). The lateral boundaries of the features were plotted and the wall profile drawn. The soil matrix surrounding the baked earth concentrations (Plate 8-2b) and the concentrations themselves were excavated. The feature contents were retained for flotation processing and later analysis.

Continued excavation in the area among the initial concentrations revealed a small, thin lens of baked earth (F. 105), and a few centimeters lower and immediately below it, a densely packed concentration of fine, granular baked earth in a carefully prepared, shallow, oval basin (F. 106). The sides and floor of the basin were bright orange in color, apparently due to thermal alteration of the clayey subsoil. Three small postmolds were located, approximately on a line, north and west of F. 106, and at the same and slightly lower elevations (see Figure 8-4). Other postmolds were sought but none were found. Given their alignment and corresponding depth in the ground, it is reasonable to assume these postmolds functioned together and are contemporary with each other. Since postmold A was covered by the contents of F. 102, its construction must be earlier than the deposition of this concentration of baked earth. The remants of the postmolds are at about the same absolute elevation as the basin (F. 106); consequently, the structure represented by the three postmolds seems likely to be contemporary with and functionally related to F. 106. It may have been a short wall, a windbreak, perhaps.

East of the F. 101-106 complex, a large, darkly stained area was noted in units N1052-1056, E362-364. This deposit was designated F. 107.

After plotting the lateral boundaries, excavation of the feature showed it to be a broad (1.6-1.7 m across), shallow (maximum thickness, 13 cm) lens of organically stained soil (Figure 8-2) containing some fire-burned limestone rocks, a little pottery and some lithic debris. In absolute elevation, Feature 107 lies about midway in the vertical zone occupied by the F. 101-106 complex. The possible functional interrelationships among Features 101-107 will be further explored later in this section.

Feature 108 is a small (0.9 m across), shallow (8 cm deep) deposit of darkly stained soil and a few fire-heated limestone fragments located in unit N1043 E356, about 10 meters south of the F. 101-106 complex. Although an artificial feature, the lack of diagnostic artifactual remains prevents making a cultural assignment for this feature.

Feature 109 at N1038 E352 was defined by a cluster of limestone fragments and a darkly stained area (20 cm by 30 cm) of no appreciable thickness. It disappeared after a few passes of the trowel and contained no culturally diagnostic remains.

We note here that Features 101-106 contained no fire-burned rocks although Features 107-109 each had a few of them. Also, while there is vivid evidence of burning and/or baking in Features 101-106, the amount of charcoal present is extremely small given the abundance of baked earth. In fact, not enough charcoal was recovered from any of these features to combine for a radiocarbon assay.

A large area surrounding the primary deposit at 23 CL 274 had been carefully examined after the initial clearing operation. Subsequent systematic and casual surface examinations revealed no other significant cultural deposits although several projectile points, some potsherds, and a few other prehistoric artifacts were periodically recovered, especially to the southwest of the main locus, a zone of relatively heavy pedestrian traffic. The point here is that the primary cultural deposit at 23 CL 274 is very restricted in areal extent, a point to be kept in mind in evaluating the function of the site.

Artifactual Remains

The lithic and ceramic artifacts from 23 CL 274 have been previously described in Chapters V and VI. Table 8-1 lists the features, their dimensions and general contents, and Table 8-2 shows the distribution of ceramic and lithic artifacts. The quantities of potsherds and lithic debitage from the features are small; only 8 sherds and 39 lithic items were recovered from Features 101-106. Feature 107 contains 18 sherds and 17 lithic items. This greater frequency of artifactual remains, the presence of fire-burned rocks, and the absence of burned earth fragments suggest that F. 107 served a different function than the Features 101-106 complex.

The pottery and lithic contents shed little light on the function of Features 101-106. The 7 shell-tempered sherds imply a probable Steed-Kisker phase age for this complex and the single grit-tempered sherd (from Feature 101B) suggests an earlier Late Woodland presence at

this locus. Small, corner-notched projectile points, generally attributable to the Late Woodland period, have been recovered from the general area of the primary cultural deposit (see Table 8-2), but no projectile points at all were found in any of the features. The lithic debitage incorporated in the contents of Features 101-106 consists of only 54 items distributed among 5 categories: bifacial thinning flakes (37), flat flakes (7), decortication flakes (5), biface fragments (2), and chipping shatter (3). The absence of finished stone tools is noteworthy. The lithic items present in Features 101-106 suggest implement production and resharpening activity in the general area, which, I think, are unrelated to the primary function of this complex. It seems likely that the association of these lithic specimens with the baked earth-filled features is fortuitous, the result of the incorporation of cultural debris already present at this locus into the facility which became Features 101-106. The same kind of industrial debris is widespread on the ridge around these features but finished implements, other than projectile points (4 complete and 6 fragmentary specimens) are exceedingly rare (Table 8-2).

Cultural Affiliation

I have dissociated the lithic artifacts from the functions of Features 101-106 and yet have allowed the association of the shell-tempered sherds for assigning cultural affiliation to this complex. The rationale is simple: none of the lithic items are diagnostic of known cultural phases. The Platte Valley sherds represent the latest identifiable occupation at this locus; since sherds of this ware are included in some of the features, and nothing more recent is, the Steed-Kisker assignment is logical and reasonable. Determining the function of the complex is, on the other hand, more difficult than determining its cultural affiliation.

Functional Determination

A number of functions have been suggested. On her visit to the site, before excavations were complete, Patricia O'Brien said we might expect to find a storage pit beneath the concentrations of baked earth that she saw exposed on the excavated surface. Some kind of a cooking facility naturally suggests itself. A kiln or pottery-firing facility has also been suggested. Analogs have been searched for in the published literature but without success. It is because of the apparent uniqueness of this site, that this extended discussion has been presented. Consideration of two more categories of data may contribute to our understanding of the function(s) of the complex represented by Features 101-106 and 107.

The preponderant constituents of Features 101-106 are baked earth fragments. This term was purposefully chosen because it is more inclusive than the term daub and is without the implications of the latter term. In fact, the baked earth materials include what would commonly be called daub (fired clay with plant impressions on their surfaces), as

well as pebble-size fragments, and a granular, powdery component (especially in Feature 106). The plant-impressed specimens range up to 46 gms and 7 cm in maximum dimensions. The upper units of the complex contained the larger elements, but we cannot quantify this assertion since the contents of these features have been processed by flotation procedures and the finer grained materials are all gone.

The flotation processing provided the second kind of data possibly related to the function(s) of Features 101-107. Table 8-3 presents a list of the recovered and identified botanical and osteological remains from these features. The vertebrate remains are all small calcined specimens, testimony to the heat generated in the prehistoric facility, and to the probability that, previous to their final firing, these bones were already small scrapy fragments. The presence of the small, calcined bone fragments may also be fortuitous, as I suggested for the lithic debris, and need not indicate a bone-burning or meat-cooking function, although these possibilities cannot be entirely excluded. The absence of medium to large sized meat-bearing bone fragments militates against this idea, however.

The charred plant seeds and nut remains recovered from Features 101-106 include maize (Zea mays), marshelder (Iva sp.), lambsquarter (Chenopodium), wild plum, and hickory nut (F. King, personal communication; see Chapter VII). The numbers of seeds and quantity of nut shell fragments are small and they too could be fortuitous inclusions. Nevertheless, I am inclined to see the main purpose of the facility represented by Feature 101-106 as being for the parching or roasting of plant seeds in preparation for storage or more immediate use. This step, it may be suggested, would have exterminated any insects or vermin associated with the lot of seeds, not an unimportant consideration in preserving stored seeds. Alternatively, the facility may have been an earth oven used to bake some foodstuff.

In Figure 8-5, we schematically depict a hypothetical sequence of events leading to the formation of Features 101-107. A small pit is excavated into the subsoil (loessial clay) and a fire is set in the pit baking the walls and floor while simultaneously sterlizing the pit. The remains of the fire are removed and a layer of granular baked earth is spread over the bottom of the pit. This material may have been scraped from the upper walls. A cap of clay is spread over the bottom layer to serve as the floor of the roasting chamber. Containers with the substance to be baked/parched/roasted are placed on this floor and covered over by reeds and sticks, then by clay daub. A second fire is set on top of this structure and when the cooking process is completed, the remains of the fire were removed and dumped in a shallow basin (Feature 107). When the cooked substance was wanted, the baked daub-covered structure was torn away, the fragmentary daub ending up in the nearby concentrations designated Features 101-104. The Feature 102 contents were dumped into a pit or hole from which a post (Postmold A) protruded. The structure represented by Postmolds A, B, and C existed before Feature 102 was created and is likely to be contemporary with the cooking facility and functionally interrelated with it.

At site 23 CL 274, a number of features are chock-full of baked earth fragments, some with distinct plant impressions, others with a

gravelly or granular nature. This material gives positive evidence of intense burning at the site. Charcoal, charred seeds, calcined bone fragments, and thermally altered chert debitage confirm this interpretation. However, the complex of features does not just seem to be a dump for refuse from other activity centers although some of the categories of burned remains (e.g., chert, calcined bone, sherds) may be accidental inclusions. We theorize that the prehistoric aboriginal facility was constructed and used for cooking, heating, or firing some substance or objects. Retrieval of the substance or objects led to the destruction of the facility and to the dispersal of the upper portion of the facility (baked earth) to the concentrations designated Features 101-104. The three postmolds (A, B, C) may represent a windbreak erected to the northwest of the cooking facility; it predates the deposition of the baked earth in Feature 102 and is presumably contemporary with the cooking facility.

What was being cooked or fired? We discount the possibilities that bone, chert, or ceramics were being intentionally treated, although all three materials are found in the various features. The calcined bone fragments are all quite small and identifiable only as mammal bone. Although probably indicative of mammal procurement and utilization at the site at some time, these minute specimens are probably accidental inclusions in the fill of Features 101-106, remnants of earlier activities. The chert debris is small-scale, the largest flake being 5.8 gms in weight. These specimens hardly seem to be appropriate for heat treatment with the intention of further modification; of course, larger items could have been removed. Of the 54 chert items in Features 101-107, 21 or 38.9 percent are thermally altered. This proportion is not significantly higher than that for the other areas of the site which produced 459 chert items, of which 157 or 34.2 percent were thermally altered. The five shell-tempered and one grit-tempered sherd in Feature 101 indicate the mixed nature of the cultural remains. Feature 107 contains 17 shell-tempered sherds and one grit-tempered sherd. Interestingly, the lowest part of the cooking facility (Feature 106) contained not a single sherd, but it did hold 35 bone fragments and 8 lithic specimens.

Any of the thermally-related activities implied by the presence of bone fragments, chert debris, and potsherds could have been conducted at 23 CL 274. But a better choice, I believe, is one related to cooking or preserving plant seeds. A few of these are present along with charred nut shells and some wood charcoal. This interpretation is based on positive evidence (i.e., presence of charred seeds) and the somewhat subjective elimination of other possibilities. If the interpretation that the Feature 101-107 complex represents the remains of food processing, that is, a plant seed roasting facility, an anomalous situation is implied. Where are the living quarters for the group using the cooking/preserving facility? Although the upper portions of some features at 23 CL 274 may have been truncated by plowing (e.g., Features 101-104, 107), Features 105 and 106 and Postmolds A, B, and C were not so modified. The widespread but sparse artifactual remains at the 23 CL 274 locus are not indicative of a substantial long-term occupation in either Late Woodland or Steed-Kisker times. Since we removed the surface vegetation and plowzone from several acres surrounding the Feature 101-107 complex, we cannot have missed any nearby residential complex.

The non-residential nature of Site 23 CL 274 is manifested by positive and negative evidence. The primary function of Features 101-107 is interpreted to be in processing plant foods, specifically cooking and preserving seeds. While these could have been stored in place for some time, it seems unlikely that storage was the primary purpose of this singular complex. Thus, this interpretation varies somewhat from that for apparently similar facilities reported by W. D. Strong (1935: 80, cited in O'Brien 1978: 6), who notes that fires were built over caches of food. I suggest that it is the treatment of the seeds that is primary at these facilities, not their storage which would be more safely accomplished at places of residence. As evidence for permanent residential structures is missing at 23 CL 274, the Steed-Kisker group responsible for the food processing facility presumably had its primary residential sites elsewhere, perhaps on the floodplain at sites like 23 CL 113 or 118. Of course, Steed-Kisker peoples could have resided at 23 CL 274 without leaving traces of their residences. In fact, one should expect that they did dwell here, however briefly, and that they engaged in a variety of activities other than those indicated by Features 101-107. Nevertheless, by virtue of the character of these features and their inferred function, 23 CL 274 becomes a unique component of the Steed-Kisker subsistence-settlement system.

We turn now to the second of the two unusual Steed-Kisker sites, 23 CL 276, utterly different from 23 CL 274, and any other reported Steed-Kisker sites as will become clear in the next sections.

SITE 23 CL 276

Field and Recording Techniques

As stated above, site 23 CL 276 was discovered when the machine removal of dense vegetation and plowzone revealed several dark stained areas and isolated artifacts. Initially, a grid of 1 m x 1 m squares was established over the southwestern part of the site; 2 m x 2 m units were later employed as excavations were expanded to the east and north (see Figure 8-6). This grid was tied to the north-south base line that we had previously established to connect all the prehistoric sites in this locality. Site 23 CL 276 is located on the North 870 (meters) east-west gridline and we originally designated it the N870 locus. 23 CL 274 is at the North 1050 locus.

Shovel-slicing was initially employed to remove the remaining soil above the cultural deposits and features. The soils so removed were screened through 1/4-inch mesh screen. The trowel was substituted for the shovel when features began to appear. These were defined and plotted on coordinate graph paper. The heavy concentration of artifactual remains (Feature 2) at the southwest corner of the site was excavated in 1 m x 1 m units, 5 cm deep. Elevations were determined with a transit and related to an artibrary datum point located at N 870 E 280. As excavations expanded east of Feature 2, the first postmolds were encountered. These were defined in plan, plotted, and then sectioned vertically to allow drawing their profiles. The larger features were generally excavated in quadrants and their cross-section profiles

were drawn when two opposite quadrants had been removed. The contents of these features were bagged and later processed by flotation procedures.

The precise locations of specific artifacts (e.g., rim sherds, stone tools) were recorded, but most of the artifacts are located only to within a 1 m x 1 m or 2 m x 2 m square, or to the feature in which they were recovered. (In graphically displaying the distribution of potsherds, for instance, sherds without precise provenience from a particular square are shown clustered around the center of that square, as in Figure 8-7). In addition to graphically recording the postmolds and features, photographic documentation of these was made, both in color (transparencies) and black and white. Artifacts precisely plotted were inserted into separate, labelled envelopes. A written record was made for each excavation unit as it was completed. These were all retyped in the lab and checked by the field supervisors.

The Four-Sided Structure

The identification of a four-sided structure at 23 CL 276 is based on the presence of three single rows and one double row of postmolds arranged in the form of a large, cornerless square (see Figure 8-7). The single postmold rows form the west, north, and east sides of the structure, and the double row forms the south side. The outer dimensions measured at the midpoints of the postmold rows are 11.20 m (N-S) and 11.03 m (E-W). A large structure is indicated by this arrangement and these dimensions. We will use the terms structure, wall (= postmold row), and corner-opening without prejudice to later attempts at functional interpretations.

Inspection of Figure 8-7 reveals a marked degree of precision in the arrangement of the postmold rows and considerable regularity in the spacing between the individual postmolds. The west and east rows are aligned to within 2-2.5° east of true north, and the north and south rows are very close to perpendicular to the former rows. Before discussing the spacing of the postmolds, it is necessary to point out that the west row cuts across Feature 9, a refuse filled depression, and one postmold of this row probably went undetected in the dark fill of this feature. Allowing one more postmold for the west wall than we actually observed, there are 12 postmolds each in the west, north, and east rows, spaced on the average, .64 to .66 m apart (centerpoint to centerpoint; see Table 8-4). The average spacing along the outer south row with seven postmolds in 4.3 m is .71 m, whereas the spacing on the inner south row (four postmolds, 4.6 m) is 1.53 m. The intra-postmold spacing varies, of course, as is shown below:

Intra-postmold Distance

Row	Distance	Mean	Standard Deviation
West Row:	.52 to .82 m	.662	.092
North Row:	.56 to .76 m	.673	.086
East Row:	.54 to .80 m	.675	.088
Outer South Row:	.44 to 1.10 m	.727	.237
Inner South Row:	1.46 to 1.68 m	1.53	.127

The spacing in the outer south row is more variable than in the west, north, and east rows; at the same time, the interval of the inner south row is much greater, on average and absolutely, than in the other rows.

The reader's attention is drawn to the postmold or small feature (Feature 12), 2.1 m west of and on a line with the inner south wall. If this postmold/feature was originally part of the inner south wall, then this wall measured 6.93 m and was much closer in length to the adjacent and opposite rows. The inner south wall may have been the original south wall of the structure and, if so, it was rectangular and not square. No physical evidence exists which indicates that either south wall is earlier than the other, or any of the other three walls. We will address the chronology of events at the site in a later section.

Other postmolds or small pits are found within the four-sided structure:

1. A cluster of three near its center (Features 18, 19, and Postmold E).

2. One within the northwest opening and two near the north wall;

3. One within the southeast corner, and one near the inner south wall;

4. Two near the west wall and one between the sixth and seventh postmolds of the west wall;

5. A single postmold about midway between the central group and the east wall.

Of the three near the center, the southeast one lies at the exact center of the structure (as determined by intersecting diagonals joining the intersections of the outer postmold rows when extended). These three closely spaced postmolds might represent the remains of a substructure that supported a roof; however, their shallow depths (10-20 cm) and average widths (18-22 cm), and their distances from the outer postmold rows (4.28 to 5.2 m) militate both against this idea and the presence of a central aperature ("smoke hole") in a hypothetical roof. Meaningful patterning in any of the other internal postmolds is difficult to determine. Any two, of course, determine a straight line but only the two southern central postmolds can be connected with any others by a straight line, one near and the one within the western wall. As the distance between them is 3.5 m, a functional-structural explanation of this alignment seems unrealistic.

As depicted in Figure 8-7, numerous features are located in the vicinity of the four-sided structure, most within it, a few without. These are tabulated with their contents in Table 8-6. Feature 2 is the large midden area located west of the southern part of the west wall; it contains an abundance of cultural material. Feature 11 is a small pit outside the west wall that contains only shell-tempered pottery (42 sherds). Feature 9 is a large, refuse-filled pit located both outside and inside the west wall of the structure; that is, the wall cuts across the feature and one postmold penetrates the edge of the feature. We

interpret this to mean the wall post-dates the filling of the refuse pit.

Feature 17 is a concentration of fire-burned limestone rocks, associated charcoal, and scant artifactual remains. Three C14 dates were obtained on charcoal from the rock layer or below; they are A.D. 710, 745, and 830, uncorrected for radiocarbon flux (see Chapter VII for additional discussion). Feature 20 is a second, larger concentration of fire-burned limestone rocks, 2 to 4 m east of the northeast corner of the structure, which also contains charcoal and some pottery. Two C14 dates (uncorrected) on charcoal from this feature are A.D. 720 and 970 (see Chapter V for discussion).

Within the structure are three features (Features 8, 14, and 15) of similar form: elongate (long axis north to south), moderately large (longest dimensions, 1.02-1.80 m), and shallow (depth, .06-.10 m). Features 14 and 15 contain a few potsherds, Feature 8 none. These three features may represent shallow depressions filled with organically and artifactually enriched soil in the preparation of the floor of the structure. Feature 5, in the southwest corner of the structure, is somewhat similar to these three except it is considerably deeper (20 cm deep x 1.2 x 1.0 m). Feature 10, in the northwest corner, and Feature 16, in the northeast corner, are small but relatively deep (20 to 27 cm), steep-sided pits of irregular outline. Feature 16 contains 15 sherds, while Feature 10 contains only three sherds.

It is obvious by now that none of the features within or outside the four-sided structure is very deep; the deepest is only 27 cm below the surface where it was defined. Most of the wall postmolds are considerably deeper, by as much as 28 cm (see Figure 8-6). Likewise, the internal postmolds are shallower than the average for the wall postmolds. This fact suggests that the internal postmolds probably did not function to support a roof over the structure since the internal posts were not implanted deeply in the ground. This induction is supported by the irregularity in the distribution of the internal postmolds, excepting, perhaps, the three centrally located ones (Features 18 and 19, and Postmold E), which were not widely spaced as might be expected for a central roof support structure.

None of the features qualify as re-used, refuse-filled storage pits; they are in general too shallow and slope-sided. They exhibit no perceivable regularity in their distribution. The location of Feature 17, a concentration of fire-burned limestone and charcoal, within a meter of the north row of postmolds, raises the question of its contemporaneity with the north wall. Is it likely that an intense fire would be made so near to a wall? The presence of Feature 16, situated almost exactly within the northeast opening, raises the question, was it in use when the corner-opening was functional? Likewise, Features 5 and 6 which are located near the southwest corner opening. A plausible explanation of this situation will be offered below, following a discussion of the horizontal distribution of several classes of artifacts and of the vertical distribution of the features and postmolds.

Horizontal Distribution of Artifacts

One of the noteworthy aspects of the horizontal distribution of the ceramics, chipped stone debitage, and rough rocks is the paucity of these classes in the western and southern parts of the area within the four-sided structure. The data for the lithic remains are depicted in Figure 8-10. The distribution of the pottery (Figure 8-7) exemplifies this situation and will be the first to be discussed. After plotting the distribution of all potsherds, their great density in Feature 2 became apparent, and we considered the possibility that this mass of potsherds had originally come from the area within the four-sided structure. To test this hypothesis, we attempted to find sherds from within the structure and its features and from Feature 2 that cross-mended with each other. Our success was limited to three examples of cross-mended pairs and one pair of sherds from the same vessel; these matches show that the hypothesis is viable.

Curiously, in each instance, the matched pairs are of grit-tempered pottery. In one instance, a Nebraska Culture rim sherd (Plate 5-2) from Feature 2 articulates with a body sherd from the north central part of the internal area within the structure. A body sherd from the northeast part of the structure articulates with a body sherd from Feature 2. A rim sherd from Feature 9 comes from the same vessel as a rim sherd from just outside the northwest corner of Feature 2. Here is evidence supporting the hypothesis that pottery was removed from the area of the structure and deposited in the midden dump (Feature 2). The final match consists of two rim sherds, one from the upper level of Feature 17, the second from 4 m southeast. The latter may represent movement caused by disturbance of the upper levels of Feature 17. It is indeed unfortunate that we had no success in finding cross-mended pairs among the shell-tempered pottery, but given the eroded state of their edges and the lack of surface decoration or treatment, this is easily understood.

It is worth pointing out here that the distribution of the shell- and grit-tempered pottery does not exactly coincide. In Feature 2, shell-tempered sherds are overwhelmingly predominant. In Feature 11, all 42 sherds are shell-tempered although seven grit-tempered sherds come from the adjacent square on the northwest. Elsewhere, clusters of only grit-tempered or only shell-tempered sherds were recovered in some excavation units (i.e., 1 x 1 m or 2 x 2 m squares). Feature 5 has 8 sherds, 6 of which are grit-tempered. Feature 20, the concentration of fire-burned rocks outside the northeast corner, deserves additional comment. Its southwest corner was first identified and excavated; it produced 5 grit-tempered sherds. Expanded excavations to the east and north produced, above the fire-burned rocks, shell-tempered sherds, but when the rocks were exposed only one shell-tempered sherd was found among the rocks along with eight thick, dense body and basal sherds of a grit-tempered, cord-impressed, subconical vessel. These grit-tempered sherds are intrinsically part of the layer of fire-burned rocks; the shell-tempered sherds are a later deposit, even though one of the latter has apparently been displaced downward (see Figure 5-7 and Chapter V).

A somewhat similar situation characterizes Feature 17. It was excavated in two stages. The rock layer was exposed, plotted, and a section was created by removing the eastern one-quarter. Two grit-tempered and six shell-tempered sherds were recovered from above the rock layer. When we removed the remaining part of the fire-burned rocks, not a single sherd was recovered, and, in fact, two crude chert flakes were all that accompanied the fire-burned rocks.

The distribution of rough rocks and chert debitage (not including tools) is displayed in Figure 8-10 where the actual frequencies of these categories are given by excavation unit. Inspection of this figure will reveal the greater density of items in both categories in the area northeast of an imaginary northwest-southeast diagonal drawn through the structure. Because our excavations units at 23 CL 276 were 1 x 1 m or 2 x 2 m squares, it is not possible to exactly partition the area within the structure into equal halves; the edges of the excavation units do not coincide with the lines determined by the postmold rows. It is possible, however, to select two equal size areas encompassing both the interior of the structure and extending slightly beyond the postmold rows for comparison of the density of rough rocks and lithic by-products in the two halves of the structure and with their density in Feature 2. These data are tabulated below:

	Lithic By-Products	Rough Rocks	Overall Density
Northeast Unit (15 2 x 2 m squares)	204	195	$3.4/m^2$
Southwest Unit (14 2 x 2 m squares and 4 1 x 1 m squares)	89	92	$1.5/m^2$
Feature 2 (15 1 x 1 m squares)	265	161	$10.7/m^2$

(The division of the structure's interior area is according to a zig-zag, NW-SE diagonal following the edges of 2 m excavation units.) These data, except for Feature 2, do not include the counts of these remains in the various features found within the structure. The southwest unit has less than one-half the density of rough rocks and lithic by-products present in the northeast unit. This situation closely parallels the distribution of potsherds within the structure (Figure 8-7) and provides additional evidence in support of the thesis that the locus of the structure was cleared of much cultural debris in preparation for the construction of the four-sided structure, this debris being deposited in Feature 2.

Our analysis of the distribution of the features, postmolds, and pottery at 23 CL 276 indicates the probability of several events having taken place at this site: the removal of potsherds from the area within the structure (but not necessarily after the structure was built) to the midden area (Feature 2), the filling of certain features (Feature 11) with only one type of ceramic ware, the disturbance of pre-existing features by the mixing of later ceramics with earlier ceramics, the

erection of a wall which intersected a pre-existing feature, and the filling of shallow depressions in the process of clearing and leveling the surface. A chronology of these events will be presented in a subsequent section.

Vertical Distribution of Features and Postmolds

Our field recovery and recording techniques included mapping and plotting the profiles of all identified features and most postmolds. Figure 8-7 shows their horizontal distribution and Figure 8-9 schematically depicts their vertical distribution. The discussion which follows is intended to explore the utility of these data in understanding events which have taken place at the enclosure.

The post-occupational history of 23 CL 276 is unknown in any detail. The locus has been farmed in recent years, often enough to destroy any natural soil profile but not so often as to have produced a clearly distinct plow zone overlying the sub-soil. As previously described, we had the area stripped of surface vegetation and a thin layer of overburden amounting to 15-25 cm (6-10 inches). The reduction by stripping was stopped when we detected cultural remains or when we thought we had removed the plow zone. After the site was partially staked out, excavations began along the western edge, where Feature 2 materialized, and proceeded eastward and northward. The various features and postmolds were revealed by shovel-slicing operations which maintained level floors within the 1 m by 1 m or 2 m by 2 m excavation units. With the exception of Feature 2, none of the features or postmolds were visible on the machine-prepared surface. The existence of the four-sided enclosure only gradually became known with the expansion of our excavations. It would seem then that our excavations discovered the postmolds and features as high in the ground as was possible.

The north row consists of 11 postmolds (Nos. 11-21) which form a straight line and number 10 which produces a turn to the south at the west end. These postmolds range in length from 7 to 50 cm; 6 exceed 40 cm, 2 are 30 cm long, 2 are 10 cm or less, and 2 are of unknown length (not having been drawn). The upper surfaces of the north row postmolds appeared between 88.48 and 88.52 meters arbitrary elevation. The outer south row consists of seven postmolds which form a fairly straight line. They range in length from 12 to 45 cm; 4 exceed 30 cm, and one is unrecorded for length. The upper parts appeared between 88.40 and 88.45 meters arbitrary elevation, lower than all north row postmolds. The inner south row consists of 4 postmolds (A, B, C, Pm. 34) which form a very straight line about .65-.75 m north of the outer south row of postmolds. These four range from 10 to 32 cm in length, and their upper surfaces lie between 88.40 and 88.44 arbitrary elevation, almost the same as for the outer south row. Feature 12 is a small (22 by 13 cm), shallow (5 cm deep) depression 2 m west of and almost in-line with the inner southern row to the east; however, it seems too shallow and distant to have been part of the structure formed by the inner southern row of postmolds.

The west row consists of 11 postmolds (Nos. 42, 43, and 1 to 9, south to north). They range in length from 16 to 55 cm, 8 exceeding 35

cm. Their upper surfaces fall between 88.48 to 88.60 meters arbitrary elevation, the lowest values being on both ends (88.48-88.52). Postmold 7 is intrusive into Feature 9, a moderate size refuse pit, and is the highest postmold at 88.60. The definable boundaries of Feature 9 were drawn at 88.61, although the feature was observable at about 88.64. The extra wide spacing between postmolds 7 and 8 suggests that we may have missed a postmold in the dark fill of Feature 9.

The east row consists of 12 postmolds (Nos. 22-33, north to south) which forms a very straight line. Their upper surfaces lie between 88.42 and 88.50 meters arbitrary elevation, and they range in length from 24 to 53 cm; 9 exceed 34 cm. The upper surfaces of the northern postmolds in this row are consistently at 88.50, while the remainder vary irregularly 2 to 8 cm lower, giving this row an uneven dip to the south.

The central features and postmolds (Features 18 and 19, Pm. E), all located in a single square meter unit (N877 E287), are small pits with steep sides ranging from 10 to 32 cm in depth. Their upper surfaces lie between 88.54 and 88.55 meters arbitrary elevation, slightly higher than all rows except some west wall postmolds. The elevation ranges of the separate rows and central features are recapitulated in Table 8-6.

The recording of postmold locations, profiles, and depths was undertaken as a standard field practice in order to allow reconstruction of the structure or structures represented and as a means to understanding the settlement activites of the prehistoric inhabitants of the site. Specifically, the foregoing data have been presented as a means of testing the idea that the relative paucity of cultural remains in the central and southern parts of the enclosure was due to the areas having been purposefully cleared. It occurred to us that a similar result might be expected due to plowing or some other process in which the site with its contents of in situ prehistoric remains was gradually truncated or reduced over its entire area but more deeply in the southern part. An examination of the vertical position of the features and postmolds might provide a picture of differential reduction were such a process operative in the past.

In fact, Table 8-6 shows that the tops of the southern rows of postmolds are indeed lower by a few centimeters than the tops of the north row, there being no overlap between their respective ranges either. The central features and postmolds Nos. 18, 19, Pm. E are higher in their upper segments than either the north row or south row postmolds. Therefore, if there has been surface reduction over the area of the site, it has been less in the center than along the northern and southern edges. The central features are higher than all the eastern postmolds and four of nine in the western row (excepting Nos. 3, 4, 5, 6, 7). Feature 9 in the western row of postmolds is the highest feature in the enclosure at 88.61 (where drawn; it actually appeared slightly higher).

The actual metrical differences in the elevations of the upper surfaces of the various features and postmolds are not great, attaining a maximum value of only 21 cm between the highest value in the western

wall and the lowest in the southern wall. The greatest average difference is between the west row or the central features and the south row, 88.55 in arbitrary elevation compared to 88.42. Thus there are no pronounced differences in the uppermost elevations of the postmolds and features of the enclosure. The maximum vertical difference of 21 cm over a distance of about 800 cm calculates to a pitch of about 1:40, a very gentle grade of 2.5%.

Using the evidence of the location of the postmolds and features and their uppermost elevations, we have tried to assess the possibility of differential reduction of the surface at 23 CL 276 as being a causative factor in the distribution of artifactual remains within the four-sided enclosure. We conclude that the magnitude of differential reduction over the entire area of the site is limited with perhaps slightly greater lowering occurring along the southern and eastern margins. The maintenance of relatively high elevations by the centrally located features and postmold suggest that the central portion of the enclosure has suffered no more reduction than any other part, and less than most. Since this area is part of that which is "deficient" in artifactual remains, we can fairly conclude that differential reduction by natural (erosion) or artificial (plowing) agencies is not the primary factor responsible for the absence or scarcity of artifacts within the enclosure. Some other process or activity, therefore, must be the causative agent(s) and we are left with the explanation offered initially, that is, the locus of the four-sided structure was intentionally cleared of much of its cultural debris before or during its construction.

A CHRONICLE OF EVENTS AT 23 CL 276 AND THE CULTURAL AFFILIATION OF THE FOUR-SIDED STRUCTURE

In Chapters V and VI, we hypothesized the presence of two major cultural components at 23 CL 276, a late Woodland component and a Middle Mississippian component. We also sounded a warning against employing this hypothesis to explain the distribution of cultural data at 23 CL 276. In the discussion that follows, we will initially proceed independently of the previous hypothesis based on ceramic variability and will outline a series of events that, we believe, resulted in the formation of the cultural deposits and features at this site. We feel that this is a necessary step before undertaking a functional explanation of the four-sided structure.

The following observations on the arrangements of cultural features and distribution of artifactual remains will form the starting point for developing the chronological model of events at 23 CL 276:

1. The arrangement of the extended rows of postmolds forms a four-sided pattern without corners; we assume this pattern represents an above-ground structure with four sides and designate it "the four-sided structure," or simply "structure."

2. Three postmolds (Features 18 and 19, Postmold E) are located at or very near the exact center of the structure, and are assumed to be contemporary with it.

3. Some postmolds within the structure are distributed in an apparently unpatterned fashion; they may or may not be contemporary with the four-sided structure.

4. Feature 9 is located astride the west row of postmolds, and one of the postmolds penetrates the southern part of the feature.

5. Feature 17, a concentration of fire-burned rocks, is located about one meter south of the north row of postmolds; there is no evidence for the wall having burned.

6. A number of debris-filled features are located within the corner openings of the structure; these were presumably already filled when the corner openings served as passageways for pedestrian traffic.

7. The distribution of non-feature contained artifacts (potsherds, lithic debitage, rough rocks) is quite variable within the structure; there is a marked deficiency in these remains in the southwestern one-third or so of the area bounded by the four-sided structure.

8. Feature 2, west of the southwest corner of the structure, is the final resting place of abundant ceramics and other artifacts, all of which were located elsewhere prior to their having been deposited in this depression; this depression or hole existed or was excavated to accommodate these remains.

9. Feature 20 is a large concentration of fire-burned rocks located 2 to 4 m east of the northeast corner of the structure; within Feature 20, the potsherds are differentially distributed according to temper type.

10. A few features contain only shell-tempered or grit-tempered pottery; for instance, Feature 11, outside the west wall, contains 42 shell-tempered sherds and no grit-tempered sherds.

The foregoing observations warrant the following interpretations:

1. The construction of the west wall of the four-sided structure postdates the filling of Feature 9; we assume that the four sides of the structure existed simultaneously.

    a. Since Feature 9 contained both shell- and grit-tempered potsherds, both wares were present on the site before the structure was built.

    b. If the different wares represent temporally different occupational episodes at 23 CL 276, the structure cannot be assigned to the earlier episode.

2. Numerous features are the repository of cultural debris, materials which were previously located on other parts of the site before being relocated.

a. Of the nearly 250 sherds in Feature 2, two articulate (cross-mend) with sherds from within the structure (e.g., the Nebraska Culture rim, No. 1150 with the body sherd, No. 1112a; grit-tempered body sherds No. 487 and No. 1387). These two instances directly support the interpretation of the relocation of artifactual remains from within the structure to F. 2.

b. We can further suggest that a large part of the site was cleared of cultural materials which were then dumped into various excavated pits or depressions (Features 2, 9, 11, 16, etc.); the soil removed during their excavations may have been spread around to level the surface of the site or cover debris-filled features before construction was undertaken.

3. Feature 17, a hearth located midway along the north row of postmolds, is unlikely to have been contemporary with the wall; an intense fire at this spot would have endangered the standing wall, and there is no evidence for the burning of this wall or any of the structure.

   a. On the basis of the combination of shell- and grit-tempered sherds in the upper zone of Feature 17, it, like Feature 9, already existed when the walls of the structure were built.

   b. The tight cluster of three radiocarbon determinations dates Feature 17 to the 8th or 9th centuries A.D.

4. Feature 20, with two radiocarbon determinations on charcoal from the level of fire-burned rocks, is dated to the 8th to 10th centuries A.D.

   a. The grit-tempered basal and lower vessel sherds from this same layer in Feature 20 are assigned to the same time range.

   b. The shell-tempered sherds from the zone above the fire-burned rocks are later accretions (see Chapter V and Figure 5-7 for a fuller treatment).

5. The cross-mended Nebraska Culture sherds from Feature 2 and the central part of the structure were present on the site before the activities that led to their final relocation took place, that is, before the structure was built.

The events we have identified at 23 CL 276 comprise the following scenario:

1. An early occupation or occupations that account for Features 17 and 20; the grit-tempered sherds from the fire-burned rock level identify the cultural component as Late Woodland and the C14 dates place it (them) between A.D. 700 and A.D. 1000.

2. There followed an occupational hiatus of undetermined length, during which time natural agencies had an indeterminable affect, although Features 17 and 20 are likely to have become covered by soil.

3. Subsequent occupation introduced shell-tempered pottery to the site in addition to other Middle Mississippian artifacts (e.g., projectile points). Sometime during this phase, contacts of undetermined nature with contemporary Nebraska Culture groups to the north account for the introduction of the Beckman Tool Impressed vessel into the ceramic assemblage.

4. Later during this phase, activities involving the excavation of pits and their subsequent filling with ceramic and other artifacts resulted in Features 2, 9, 16, etc., which contain varying amounts of both grit- and shell-tempered wares.

5. Construction of the four-sided structure followed this clearing operation rather quickly, we suspect. The structure is attributed to the group that manufactured the shell-tempered Platte Valley Ware, the Middle Mississippian Steed-Kisker phase people.

In brief, the C14 dates and the grit-tempered pottery clearly demonstrate a Late Woodland stage component at 23 CL 276. The shell-tempered Platte Valley ware likewise demonstrates the presence of a Middle Mississippian component. The chronicle of events presented above reveals that the construction of the four-sided structure was one of the last archaeologically manifested events that took place on the site. Activities involved in clearing the locus of the structure resulted in the mixing of the Late Woodland and Middle Mississippian artifactural remains in several features. The identification of these two components is, of course, based on the distinction made between the grit-tempered and shell-tempered ceramics. However, the chronicle of events has been independently achieved and is anchored in time by five radiocarbon assays from Features 17 and 20. The temporal priority of the grit-tempered ware over the shell-tempered is best exemplified in Feature 20 where the former is intimately associated with the layer of fire-burned rocks from which the datable charcoal was recovered. Late in the period of Middle Mississippian occupation, the four-sided structure was built for reasons to be considered in a later section.

A COMPARISON OF THE 23 CL 276 STRUCTURE WITH OTHERS IN THE KANSAS CITY AREA

The four-sided structure of 23 CL 276 measures 11 x 11.2 meters (interior dimensions) and occupies an area of 123.2 square meters, or 1325.4 square feet. Houses from the Friend and Foe site (23 CL 113), the closest prehistoric structures that may be compared with that from 23 CL 276, are modest in area, occupying only 238 to 255 square feet (Calabrese 1969: 195). In addition, the Friend and Foe houses are neither rectangular (or square), nor smoothly oval (or round). Calabrese designates some interior postmolds as central support posts, but these have no standard locations within these structures. The house structures at 23 CL 113 lack centrally placed hearths, the 4-post central substructures, cylindrical or bell-shaped pits, and as Calabrese (1969: 195) notes, they even "lack distinctive outlines". Other sites in the Kansas City area with house structures are: 23 PL 13 (Steed-Kisker site), 23 PL 54 (McClarnon site), 23 PL 48 (Gresham site) and,

somewhat to the north, 23 BN 2 (Cloverdale site). These sites are reported by J. Mett Shippee (1972; also 1960 for the Gresham site). Two houses at the Doniphan site (14 DP 2) and one house from the Nuzum site (40 DP 10) and 40 and 60 miles north-northwest of Kansas city, respectively, complete the series.

Inspection of the comparative measurements in Table 8-7 clearly reveals the unusual nature of the structure at 23 CL 276; it is larger than all the others, only the circular House 1 at the Doniphan site approaching it in size. But these two structures differ radically in other respects, e.g., in form and in internal features. The 23 CL 276 structure lacks the four widely spaced, central support posts and the centrally positioned fireplaces present in the Doniphan site houses (Wedel 1959: 105-109, Figure 6). The pottery and other artifacts contained in the two Doniphan site houses "parallels closely that from Nebraska Culture sites further up the Missouri," according to Wedel (ibid.: 109). Although the Steed-Kisker site House 1 is almost square, it conforms to the Doniphan houses in having the quadrilateral central support substructure and centrally located fireplace. Wedel (1943: 71) interprets these remains to indicate "semi-subterranean earth-covered pithouses. . . .very similar in type to those regularly used by peoples of Nebraska Culture."

Blakeslee and Caldwell (1979) have reported data summarizing house size measurements for a number of Nebraska Phase sites. Their Table 6 reveals that mean floor area ranges between 275 and 2601 square feet. Calculations using the data in this table give a mean floor area for 48 lodges of 773.5 square feet (S.D. = 468.4), or 734.6 square feet if the one outsized lodge (at 2601 square feet) is removed from the calculations. At any rate, it appears that only two or three of the earth lodges in their sample exceed the 23 CL 276 structure in floor size. Thus, the extraordinary size of this structure is evident both in comparison to local houses and with Nebraska Phase houses.

In its square form, the 23 CL 276 structure compares closely with the Nebraska Phase earth lodges, except for the fact the former has no corners. This single trait makes the 23 CL 276 structure unique as far as I can determine. The absence of the centrally positioned quadrilateral post substructure and fireplace are negative traits that distinguish the 23 CL 276 structure from the Nebraska Phase, Doniphan site, and Steed-Kisker earth lodges. It seems unlikely that the four-sided, cornerless structure at 23 CL 276 was ever roofed over with a substantial superstructure. It lacks the necessary internal support elements; the three vertical posts indicated by the centrally located postmolds or small pits (F. 18, F. 19, Pm. E) within the 23 CL 276 structure are considered to have been inadequate to have supported a heavy, permanent roof. That this structure was not made to house people during the coldest part of the year seems indicated by the four open corners, and the inferred absence of a solid, all-weather roof is in keeping with the multiple corner openings.

A final negative feature that distinguishes the 23 CL 276 structure from the houses at the other sites is the absence of cylindrical or bell-shaped storage or trash pits. Although some domestic and industrial debris comes from the area within the structure indicating that

domestic and fabrication activities took place here, these remains do not mean that this locus was primarily a residential area throughout the period(s) of its use. The widespread refuse removal and leveling prior to and in preparation for the construction of the four-sided structure is further evidence for a change in function of the locus of the four-sided structure.

SOME POSSIBLE FUNCTIONS OF THE FOUR-SIDED STRUCTURE AT 23 CL 276

For a number of positive and negative reasons, the structure at site 23 CL 276 is denied the status of a house and must be considered a facility for some specialized activities. While this possibility was recognized during the later stages of its excavation, no change in excavation strategy or tactics was made to accommodate this thinking, and we continued our careful excavation and recording procedures as before. Although there existed the incipient appreciation of the precision with which the four-sided structure was endowed, full appreciation only materialized during the laboratory analysis. The near parallel alignment of the east and west postmold rows with the north-south grid lines was noted in the field. We found out later that these two rows of postmolds lie within 2.0 to 2.5 degrees of true north. True north and not magnetic north would have been determinable by prehistoric aborigines. With this clue to the precise orientation of the four-sided structure as a starting point, we began looking for other measures of precision and regularity. The spacing of postmolds has been discussed above. The presence of postmolds at and very near the center, first noticed in the field, has been securely substantiated by objective means (see above); postmold E lies at the exact center of the structure, and Features 18 and 19 (small pits or postmolds) form a triangular arrangement with postmold E.

With the above discoveries as a prelude, I indulged in a bit of speculation on the potential astro-archaeological implications of the structure. Imagining oneself within the four standing walls, one immediately notes the possibility of viewing the outside landscape only through the openings at the corners (assuming that the intrapost spaces were filled). The natural question, could the solsticial sunrises and sunsets be witnessed from or over a common point, came to mind. Using the central triangle of postmolds as a logical viewing station, the calculated rise and set azimuths for the summer and winter solstices were plotted on a map of the structure. Although the four azimuths fall near the open corners, not all of them lined up from the exact center point through the corner portals to the solsticial rise or set points of the sun. However, if one were to offset the observation points from the center point by the short distance of about 2 meters, the azimuth lines to the summer and winter solsticial rises set points fall within the corner portals (Figure 8-11).

The corner portals are so wide, however, that several offset positions can be accomodated. Because of their large dimensions, multiple possibilities exist for alignments with celestial bodies. For instance, using the computer tables of Aveni (1972), it can be determined that

alignments with the rise and set points of the moon, Venus, Mars, Jupiter, and Super Nova 1054 can be obtained using observation points near the central point of the four-sided structure. Using the single central point (Postmold E) and opportunistically chosen offset points spaced around it ignores the triad of postmolds (or pits) at the center of the structure (Postmold E, F. 18, and F. 19).

It is difficult to visualize what, if any kind of above ground structure is represented by these three features other than some kind of a tripodal structure. These three posts may have concurrently served as points for observing celestial events, although not necessarily simultaneously. On this assumption, we sought to employ these three positions in seeking celestial alignments, restricting our attempts to sunrise and set points on solsticial dates. Returning to Aveni's tables and using corrections for the elevation of the horizon (calculated at one degree for the vicinity of site 23 CL 276 using transects based on the USGS Smithville quadrangle), we plotted the most northerly and most southerly azimuths for solsticial sunrises and sunsets, provided they fell <u>within</u> the apertures formed by the assumed posts of the east and west walls of the structure. Using all three of the central postmolds (or pits), provocative alignments with the summer and winter solsticial rise and set points of the sun were found to exist between the southernmost and northernmost pairs of posts of the east and west walls. Figure 8-11 displays these alignments; unfortunately, all of them cannot be plotted from any one of the central postmolds.

The potential implications of these alignments are considerable. The fact that the east and west walls encompass the entire north to south transect of the sun's rise and set points is intriguing. In a manner of speaking, the east and west walls track the progress of the sun in its south to north march and back again. Is this the meaning of the east and west walls of the structure? One of GAI's graphics specialists (Rich Cima) has noticed the precisely equivalent spacing of the corresponding postmolds of the east and west rows, a correspondence that eluded us originally. Is it a coincidence that the postmolds of the west row have precisely located equivalents in the east row (excepting the missing postmold in the west row, of course)? If the posts of the west and east rows tracked the rising and setting of the sun from the winter to the summer solstice and back again, one might ask if the number of intervals between the posts is significant as a time-factoring device. The 11 intervals in the east row equate with a period of 16.6 days (365 days divided by 22 intervals), a value that does not seem particularly noteworthy. A 12 interval post-row would equate with a time interval of 15.02 days (365 divided by 24), and a 13 interval post-row would equate with a time interval of 14.04 days (365 divided by 26). There is no integer other than 5 that divides 365 evenly into a series of equal whole numbers; thus, the number of post intervals is probably immaterial.

A major problem with the previous discussion is that it ignores the potential astronomical meaning of the north and south walls of the structure. If the east and west post-rows can be used to track the sun, what comparable uses can the north and south post-rows have? It can be suggested that the east-west alley-way formed by the inner and outer southern post-rows may have been a sighting direction for viewing the

sunrise and sunset at the vernal and autumnal equinoxes, when these events occur on the horizon, due east and due west. The purpose of the north post-row, in astronomical terms, is unfathomable.

The special nature of the four-sided structure at 23 CL 276 may, of course, have nothing to do with the tracking of celestial bodies. Nevertheless, we considered it incumbent upon us to attempt a brief exploration of the structure's potential in this area. This potential has probably only been hinted at. Perhaps, it is more than mere coincidence that the structure is very precisely constructed and oriented so closely to the cardinal directions. The alignments with the winter and summer solstices for the year 1000 A.D. used for testing the astronomical potential of the structure provide additional support for the thesis. However, more experiments and tests are needed, and we do not consider the astronomical hypothesis "proven."

Even if the astronomical alignments we have found, or others were fundamental to the form of the structure, this relationship would not explain its purpose. It is clear that the social group responsible for its construction had certain capabilities in the constructional and measuremental areas. The fact that the east and west post-rows were laid out so close to true north identifies this capability which could be based on knowledge of the "fixed" position of the Pole Star, or could be based on knowledge that the sun at "high noon" casts a shadow in the direction of true north. This knowleage need not be the exclusive possession of an elite group in a semi-agrarian society. In other words, an astronomically aligned structure does not imply the presence of complex, hierarchically organized Middle Mississippian society.

If the purpose of the structure has nothing to do with astronomy, it certainly has much to do with the beliefs of those who erected it. The functions it served most likely met the needs of a social unit larger than a nuclear or extended family. Since we have previously rejected a primary residential function for the four-sided structure, it must, by elimination, have served other purposes. Its size and, of course, its form bespeak the communal nature of the structure, it seems to me. As a community building it could have been used for sacred or secular activities, or both. The community it would have served is likely to have been a dispersed one, comprising, perhaps, distinct semi-agrarian kin-groups scattered for some considerable distance along the Little Platte River. From archaeological evidence, we know that such groups were distributed north, east, south, and west of 23 CL 276. Two burial mounds (23 CL 108, the Chester Reeves site, two miles to the north, the other, 23 PL 37, the Shepherd Mound, four-miles to the west-southwest) may also have been behavioral nodes of the society responsible for the postulated community center at 23 CL 276.

Conceivably, the four-sided structure served some integrating function for the semi-agrarian groups. Persons were obviously attracted to the locus of the structure; afterall, they built it, and probably returned to it following its construction (assuming it was not a one-time event). If our speculations that the structure was not made to accommodate human domestic activities throughout the year is correct, its use during the milder months is left for consideration, although specialized (non-domestic) use might have taken place throughout the

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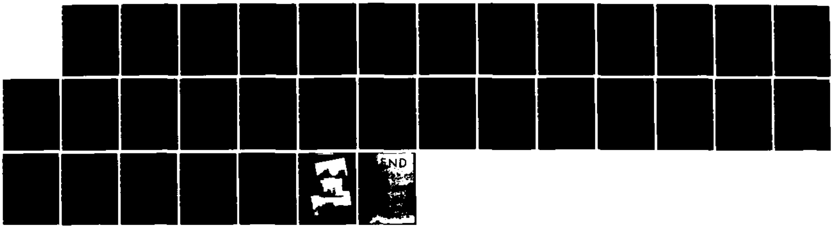

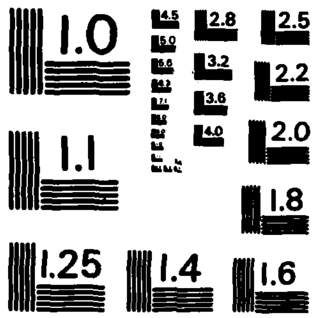

MICROCOPY RESOLUTION TEST CHART
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year. Since seasonality in the structure's function cannot be assured, events could have been held there year around. However, because of the rather harsh nature of winter weather in the Kansas City area (see Chapter II), the idea that this open-air structure served important functions in that season is decidedly less appealing than the idea that events were conducted during the mild and warm months (i.e., April through October). This time-frame encompasses the period of vegetation growth, maturation, and demise. There are a number of events during this period that have been conceived of as important by various societies. Ethnographic analogy, however, cannot provide an explication of the function of the four-sided structure at 23 CL 276, and will not be pursued in this discussion. The communally-based nature of the activities conducted at the four-sided structure is an hypothesis based on the unique nature and size of the structure. Such activities involved many individuals; how many could be accommodated within the structure? The four corner-openings are the entranceways and exits; did people parade in and out through these openings? Where did the spectators stay; within and along the walls, or outside peering in through the intervals between the posts? Clearly, no very private ceremonies were conducted at this structure. No floor fires were burning at the time of these communal activities; of course, torches may have been carried. Perhaps banners and other decorations adorned the structure. Performers may have displayed their abilities, in dancing, acrobatics, tests of strength, etc. Civil assemblies may have been conducted in the building.

Conjecture regarding the functions of the four-sided structure at 23 CL 276 could be continued, but the reader will be spared further musings. In summary, this structure may be thought of as a community center serving a dispersed Steed-Kisker population of the middle reach of the Little Platte River and its tributaries. Precisely what ceremonies or rituals were conducted at this center cannot be specified, but they were most likely carried out during the mild and warm months of the year. The regularity of the form of the structure and its orientation so close to the cardinal directions testify to the precision and skill of its builders, and, perhaps, to their knowledge of certain astronomical principles. If the astronomical alignments we discovered were recognized by its builders, the structure may have served a more esoteric function than that implied in the term community center.

SUMMARY

The facilities represented by Features 101-106 at site 23 CL 274 and the four-sided structure at site 23 CL 276 represent new types of activity nodes in the Steed-Kisker settlement system. The former has been interpreted to be a facility where plant seeds were parched or roasted or where food was baked in a semi-subterranean oven. These food preparation activities left a small quantity of charred seeds of Chenopodium sp., Iva annua, and maize (Zea mays) in the fill of the features along with substantial amounts of baked earth and daub. The predominant ceramic, Platte Valley ware, identifies this facility as a Steed-Kisker activity center, although a few sherds and projectile points indicate an earlier Late Woodland presence at this locus.

Based on the precise form of the structure at 23 CL 276, its large size, its cornerless and roofless nature, and its orientation to the cardinal directions, it is considered to be a special function community center serving the dispersed Steed-Kisker farmstead inhabitants of the Smithville Lake district. In addition to the cardinal orientation of the four-sided structure, other astronomical alignments can be plotted from the central posts through aperatures in the east and west post-rows or walls, or from para-centrally located points within the structure through the wide corner portals. Although further tests of this astronomical hypothesis need to be carried out, the possibility that rural Steed-Kisker groups might have employed such knowledge in constructing some kind of a community center has implications for the way the society was organized and what belief systems prevailed. However, the physical and ideational system represented by the structure need not necessarily reflect a hierarchially organized, stratified society. Data from two nearby Steed-Kisker burial mounds supports this characterization. Since the structure was roofless and cornerless, it seems unlikely that it was built to provide shelter or protection from the elements during the most inclement months of the year. Mild weather activities seem to be indicated, and ceremonies associated with renewal of vegetation and harvesting of plant foods may have been the raison d'être of this structure. It is attributed to the latest of the Steed-Kisker groups that occupied the site on the basis of chronological arguments using distributional data and feature and postmold relationships.

Two fireplaces at 23 CL 276 provided sufficient charcoal for making five radiocarbon determinations; four indicate an early 8th to middle 9th century A.D. age for a Late Woodland occupation of the site and the fifth gives a middle 10th century date. The Late Woodland phase occupation is also represented by the presence of grit-tempered, plain and cord-marked pottery and a few corner-notched projectile points. The Late Woodland cultural remains were incorporated into the Steed-Kisker phase features, and only in a few instances can discrete features be assigned to one or the other of these cultural phases. The Late Woodland and Steed-Kisker components have been identified through a detailed comparison of the pottery from sites 23 CL 274, 276, and others, and have been chronologically distinguished at site 23 CL 276 on the basis of the C14 dates and the chronicle of events developed for this site. Unfortunately, our investigations have provided no accurate chronometric age determinations for the Steed-Kisker phase in the Smithville area. The single date from site 23 CL 226 is considered to be much too recent.

CHAPTER IX

A REASSESSMENT OF THE STEED-KISKER SETTLEMENT SYSTEM MODEL AND CULTURE HISTORY WITH RECOMMENDS FOR THE CULTURAL RESOURCE MANAGEMENT PROGRAM AT SMITHVILLE LAKE

INTRODUCTION

In this concluding chapter, we review Patricia O'Brien's Steed-Kisker settlement system model in light of the evidence that GAI Consultants recovered at Smithville Lake. The implication of her use of W. R. Wood's remote hunting and meat procurement hypothesis are considered, both from the point of view of the settlement system model and the culture history of the Steed-Kisker Middle Mississippian population.

The debate between Waldo Wedel and W. R. Wood concerning the significance of the scanty vertebrate remains typically found at Steed-Kisker sites is reviewed; evidence from the sites we investigated suggests that a compromise explanation may be appropriate. F. A. Calabrese's hypothesis of the Steed-Kisker ancestry of the Nebraska Variant-Doniphan Phase is appraised from the perspectives of the changes in ceramics postulated to have occurred and the radiocarbon chronology pertinent to this topic.

Other theories of the fate of the Steed-Kisker culture are briefly considered and evaluated. An hypothesis antithetical to those that propose the transformation of the Steed-Kisker into or its absorption (or amalgamation) by the Nebraska Culture is suggested and means for evaluating this hypothesis are proposed.

Finally, a number of recommendations for the management of the prehistoric cultural resources and for a program of public education in the prehistory of the Smithville Lake area are offered.

EVALUATION OF P. J. O'BRIEN'S STEED-KISKER SETTLEMENT PATTERN MODEL

A requirement of the Scope of Work was to refine the Steed-Kisker cultural chronology and settlement pattern hypotheses through the investigation of a series of sites in the lower Smithville Lake reservoir. O'Brien's most recently published characterization of the Steed-Kisker settlement systems is in her paper, "Steed-Kisker: a Western Mississippian Settlement System," which appeared in the volume, Mississippian Settlement Patterns, edited by Bruce D. Smith (1978: 1-19). O'Brien sees the Steed-Kisker settlement system as comprising four functionally different types of sites:

1. Single or multiple family farmstead habitation area with houses, storage pits, and trash areas;

2. Storage sites with pit facilities, near agricultural fields or near specific wild plant resources;

3. Hunting and butchering camps, located far from the Kansas City Steed-Kisker heartland;

4. Family cemeteries in bluff-top burial mounds located near the habitation sites.

Evidence for O'Brien's Types 1, 2, and 4 comes from the Smithville Lake area, and evidence for Type 3 comes from the Vista Rock Shelter in St. Clair County (cf., Wood 1968). The best example of her Type 1 in the Little Platte valley is Site 23 CL 113 (the Friend and Foe site; Calabrese 1969) with its three residential units spread across several hundred meters. We failed to find additional examples of this type on the floodplain in a situation analogous to that at 23 CL 113, although sites 23 CL 273 and 275 may originally have been such situations. Sites 23 CL 118 (the Butcher site) and 23 CL 119 (Calabrese 1974), also situated in analogous situations, are possible but no longer demonstrable examples of the small farmstead.

O'Brien's Type 2 is based on her interpretation of the material remains and features from site 23 CL 109, the Richardson Hulse site (1977: 53-84). We have already reviewed the evidence from this site in Chapter IV and have rejected O'Brien's (1977: 102) identification of 23 CL 109 as a "new uni-functional type of Steed-Kisker site, a storage site," because, I feel, O'Brien has incompletely assessed the significance of all the archaeological data she reports for this site. In short, the three Steed-Kisker trash pits at 23 CL 109 do not mean the site was a solely food storage area.

O'Brien's fourth type, the "family cemetery in a bluff-top mound," must similarly be questioned for the Smithville area. Only two of the four proposed mounds are proven burial mounds; the first is the Shepherd Mound (23 PL 37), 1.5 miles northwest of Smithville, which was briefly examined in September, 1938, by J. Mett Shippee and Waldo Wedel (Wedel 1943: 137 ff.); the second is the Chester Reeves Mound (23 CL 108), about 4.3 km north of 23 CL 276 (O'Brien 1977: 85-101). O'Brien's third and fourth examples are sites 23 CL 208 (ca. 0.75 km southwest of 23 CL 276) and 23 CL 55 (ca. 8.4 km north-northeast of 23 CL 276). Our excavations at 23 CL 208 prove clearly that this site is not a Steed-Kisker burial mound, but is rather a pile of recently accumulated dirt containing a few historic artifacts (see Chapter IV). We also visited and inspected Site 23 CL 55 and found it to be a low pile of field stones on a gentle knoll in the center of a large pasture. It has not been tested and there is no justification in identifying it as a component of the Steed-Kisker settlement system.

There remain, then, only two proven burial mounds along the Little Platte River near Smithville, the unfortunately inadequately sampled Shepherd Mound and the thoroughly excavated Chester Reeves Mound (see also Finnegan 1977). In the case of each mound, ceramics are the significant attributes employed in assigning a Steed-Kisker authorship to the mounds and their contents. While not actually challenging the Steed-Kisker affiliation of the two mounds, I nevertheless see substantial differences in the reported ceramics, enough to cause me to question whether or not they are likely to have been contemporary or to have shown the same degree of relationship (social, economic, political) to

the Steed-Kisker type site. For instance, the glossy, polished vessels from the Shepherd Mound are not duplicated in the ceramics from the Chester Reeves Mound.

Although small residential Steed-Kisker sites are recorded for the vicinity of the Chester Reeves site, namely the Butcher site (23 CL 118), 0.5 km east-southeast of the mound, none are recorded in the vicinity of the Shepherd Mound. As reported in Chapter IV, the nature of site 23 CL 118 is enigmatic; plowing and erosion have probably reduced the habitation zone and residential features drastically, beyond the point of realistically reconstructing the community pattern. Yet, it is not unreasonable to suggest that this site was indeed a Steed-Kisker farmstead; afterall, it fits the theoretical model, and it is located near a proven burial mound. There is certainly little reason to believe that the inhabitants of the Butcher site alone supplied all the deceased individuals represented in the mound. O'Brien (1977: 92; 1978) does not assert this to be the case but does implicate the Butcher site occupants as having some special relationship to the mound. Whether it should be identified as a "family cemetery," with the exclusive connotations of that phrase, is questionable. The mounds might have been associated with broader segments of the Steed-Kisker population, such as clans or moieties, for instance, which is what I suspect O'Brien had in mind, rather than the more limited term, "family."

Although it may be realistic to think of the Little Platte Valley Steed-Kisker population as having been dispersed among numerous, scattered farmsteads, it is not warranted to assume that these units were completely independent and autonomous. The two burial mounds in the Smithville area indicate that aggregations larger than nuclear families were operational at certain times, e.g., during the mourning and interment of the group's deceased members. Undoubtedly, there were other opportunities for members from different families to come together and act in concert. The four-sided structure at 23 CL 276 is another physical manifestation of social interaction above the family or even the clan level, whatever specific rites or ceremonies may have been conducted there. It will be necessary to return to the hypothetical nature of the organization of Steed-Kisker society later in this chapter.

The Remote Hunting and Butchering Station

The last of O'Brien's four functional settlement types to be discussed is the hunting and butchering camp located at a great distance from the heartland of the Steed-Kisker culture. This type, of course, was borrowed directly from W. Raymond Wood's 1968 paper on the Vista Rock Shelter (23 SR 20) (O'Brien 1978: 10). O'Brien accepts Wood's hypothesis completely, which is to say, she visualizes small Steed-Kisker groups making extended journeys a hundred or more miles southeast of Kansas City for the purpose of procuring meat which was carried back to their settlements in the Steed-Kisker heartland.

The identification of the major cultural component at the Vista Shelter is based on the presence of decorated, shell-tempered ceramics (Wood 1968). From his analysis, Wood argues that the majority of the bone recovered from the shelter represents "food remains from the major

Steed-Kisker occupation," and interprets these remains to indicate late summer or early fall occupation(s) of the shelter (ibid.: 171-172). Wood believes that the Vista Shelter evidence means short-term occupations of the shelter by groups of Steed-Kisker peoples who are exploiting different nearby environmental zones (prairies, forests, rivers and streams, lakes, ponds) for deer and bison, mainly, and other creatures as well. The large mammals were butchered where they were taken, according to Wood, and the selected portions of the carcuses were removed to the shelter for final reduction and preservation of the meat. There seems to be no cause to take issue with Wood's interpretations up to this point.

The problem comes in the deduction that the Steed-Kisker hunting parties ranged a hundred or more miles south of their settlements in order to procure meat for the population in general. In other words, the one instance of a Steed-Kisker group using the Vista Shelter while it hunted the countryside is generalized into a regular pattern of extended, long-range meat-procurement trips. Wedel objected to this a decade ago (personal communication to Wood, 1967; cited in Wood 1968: 174) and again at the Plains Conference (November, 1979), asking the question, why would Steed-Kisker groups go so far to procure game that was readily available where they lived? Wedel has a legitimate objection. Where are the Steed-Kisker hunting stations in their home territory? Is it conceivable that they made no short forays into the nearby prairies, into the oak-hickory forests that lined the bluffs, or into the floodplain forests? Is it likely that the hunting of major game (i.e., bison, elk, deer, bear) was an activity conducted only for a few weeks in the late summer and fall, and that it could only be carried out at great distances from the settlements? It might also be asked, what other necessary activities had to be conducted during these same weeks by the semi-agrarian Steed-Kisker groups? Wouldn't this have been the time for harvesting cultigens and wild plant food?

On the basis of the evidence from the Vista Shelter, it seems likely that some small groups utilized the site for various reasons, chief among them, perhaps, as a temporary station (refuge, domicile, etc.), while exploiting the vertebrate protein resources of the local area. The latest group(s) to do so are identified as related to the Steed-Kisker groups in the Kansas City area on the basis of the ceramics and other cultural elements (Wood 1968).

A number of possibilities could account for presence of the Steed-Kisker component at the Vista site. Several of them invoke the implicit assumption of synchroneity of the Vista remains and the Steed-Kisker complex in the Kansas City area. Wood's hypothesis is one that is based on this assumption. Another would be that the Vista shelter and others like it in the southwestern Missouri Ozarks were the sites of winter habitations of some of the Steed-Kisker peoples. Since Wood (1968: 177) attributes to Dale Henning information about the presence of sites with Steed-Kisker-like materials in the area around Nevada, Missouri, and O'Brien (1978: 13) cites Donna Roper as reporting similar materials for the Truman Reservoir in western central Missouri, it would appear that there may exist a widespread, but poorly known and recorded variety of

the Steed-Kisker complex in western Missouri. Are all these manifestations to be understood as the result of hunting and meat procurement parties from the settlements in the neighborhood of Kansas City? Were this the case, one would be tempted to visualize an annual exodus of male-dominated groups departing on their extended hunting trips, and a large group of seasonal widows left to tend the fields and harvest the crops.

The transhumant hypothesis of Steed-Kisker groups migrating out of the Kansas City area and into the fringes of the Ozarks during the late fall and returning in the spring is another possibility at the time-synchronous level. Reducing the density of human population and their demands on local resources, especially animal populations, in the Kansas City heartland would be the premise of this hypothesis. The data from the Vista Shelter would be compatible with this suggestion as, presumably, would the unreported data from the other Ozark sites with Steed-Kisker materials. The return to the Kansas City area would be made in time to re-establish field rights and prepare them for planting the several cultigens available to the Steed-Kisker groups (maize, pumpkin, squash). Under this hypothetical system, a care-taker population might remain in the "permanent" settlements to insure the maintenance of property rights. A possible problem with this hypothesis relates to the nature of the autochthonous occupation of the areas used for winter residence by the transhumant Steed-Kisker groups. Were the indigenes then as eager for visitors from the Kansas city area as they are now? Assuming the broad area encompassed by Henning, Roper, and Wood's investigations was not devoid of autochthonous groups during the period in question, what kind of sympatric relations did the indigenous and intrusive populations have?

The widespread manifestations of Steed-Kisker-like materials south and southeast of Kansas City may have quite another meaning on a non-synchronous level. They may represent a later phase of this poorly known cultural complex, and, could conceivably represent the final prehistoric stage in the transformation of the Steed-Kisker society into some protohistoric or historic Indian tribe. The hypothetical dispersal of the Steed-Kisker populations into the Ozark refuge areas may have been brought about by pressure from expanding and dynamic Nebraska Phase groups to the north.

The three hypotheses presented above are not carefully wrought, finished arguments; they attempt rather to suggest some different possibilities in the interpretation of the data pertinent to Steed-Kisker culture history and settlement pattern models. Existing models have been mainly based on a synchronous plane, although some two to three centuries or more are allocated for this cultural phase. The major exception to this charge, is F. A. Calabrese's (1969) hypothesis of the Steed-Kisker origins of the Doniphan phase, a topic to be discussed later in this chapter.

O'Brien's settlement pattern model for the Steed-Kisker population is limited to four functionally different types, one of which has no counterpart in the Kansas City area (e.g., the hunting and butchering station). One can imagine a number of other "uni-functional" activity areas in the Steed-Kisker settlements system model, such as deer stands,

bluff-top signal stations, fishing holes, quarries, corn fields, berry patches, etc. A comprehensive model of Steed-Kisker resource procurement activities would be useful in directing the collection of data for the development of the settlement system model. A parallel model of the seasonal availability of resources would allow for the development of hypothetical scheduling models, predicting, as it were, when certain activities had to take place, and when the labor force had more freedom in its choice of activities. These models would need be tested by employing all the available geological, zoological, botanical, geographical, and archaeological evidence before a second generation Steed-Kisker settlement system model could be achieved.

FURTHER IMPLICATIONS OF WOOD'S BUTCHERING HYPOTHESIS

As indicated above, Wood and Wedel are in basic disagreement over the significance of the scarcity of osteological remains at Steed-Kisker sites. For Wood, the explanation of this observed phenomenon is the practice of killing and dismembering large mammals away from the loci of human settlement and the reduction of the weight and volume of meat to be carried back to the habitation sites. Wedel prefers the hypothesis that the general paucity of vertebral remains at Steed-Kisker sites was probably the result of conditions detrimental to the preservation of bone. He suspects "that acidic or other soil conditions may have been responsible" for the near total destruction of bones that once existed in trash pits and midden deposits, and thinks that it is improbable that Steed-Kisker groups "would strip their kill in the field and carry back to the village only the meat, hides, and other soft tissues" (Wedel 1943: 73).

The evidence from the Smithville Lake sites we investigated has some relevance to this debate. Local faunal resources were surely exploited by Steed-Kisker groups as the presence of osteological remains at the Steed-Kisker site (26 deer bones; Wedel 1943: 72) and scrappy remains at 23 CL 274 and 276 indicate. I do not believe that Wood means to contend that the majority of the meat eaten by the Steed-Kisker peoples was obtained over a hundred miles from their residential sites. They would presumably only make such trips when the chances of their returning with abundant meat were good, and when the local meat supplies were inadequate for their needs. The latter might have been the case in the event of over-hunting of local populations of deer, bison, elk, etc., or in the case of the degradation of the environmental niches of these mammals, e.g., forest and prairie fires reducing vegetation, droughts drying up water supplies, etc.

Wood considered Wedel's hypothesis that acidic soil conditions were responsible for the paucity of bone remains at Steed-Kisker sites. He had four soil samples from the Steed-Kisker site (23 PL 13) tested for their pH values, and all four gave pH values of 6.5 (Wood 1968: 173). Wood believes that the slightly acidic soils at the Steed-Kisker site should not be the main reason for the lack of preservation of vertebral remains. Yet, as Wood (ibid; citing Beik 1963: 181-182) himself notes, the "calcium phosphate in bone becomes soluable in faintly acid solutions

of pH 6.8, but is protected almost indefinitely in more neutral soils with a pH of 8 or more."

At 23 CL 276, the vertebral remains were generally small, fragmentary, calcined, and without diagnostic attritutes (see Chapter VII). With few exceptions, these remains were recovered from small pits or basins and one midden deposit. Soil samples from eight loci within and outside the four-sided structure were tested for their pH values (see Chapter VII). Those from directly below the features had the highest pH values, 6.7 to 7.3, and samples from within the structure but not from subfeature soil tested out at 5.6 to 6.1. The two samples from outside the structure and away from features have pH values of 5.2 and 5.4. The pH value of 6.8 is exceeded in only two of the subfeature samples taken at 23 CL 276, Features 17 and 20, the two Late Woodland fireplaces, each of which contained relatively abundant charcoal and few osteological remains. In short, the soil environment at 23 CL 276 is not conducive to the preservation of vertebral remains; even trash-filled pits have pH values that are slightly acidic and the surrounding soil pH values are very acidic (5.2 to 6.1).

Although this evidence would seem to support Wedel's hypothesis, I do not believe that soil conditions alone are the reason for the paucity and fragmentary nature of osteological remains from 23 CL 276. We have previously argued that remains of this nature recovered from the features were probably already much reduced from their original forms before being introduced into the pits and midden deposits. Although unfavorable soil conditions may have contributed to the degradation of the osteological remains before their incorporation into the features, other agents are also implicated, e.g., dogs and other scavengers, deformation caused by abrasion and exposure to the elements, etc. Carl Falk (1979) assures us that the osteological remains from 23 CL 276 are not of scatological origin, but dogs could still have reduced the larger elements to small fragments without their having gone through their digestive systems. The bulk of the osteological remains at 23 CL 276 clearly experienced a variety of conditions adverse to their preservation in the micro-environments where they remained prior to their removal to the pits and midden deposit that became their final resting places.

The important questions that remain to be answered are, what boney elements were present at site 23 CL 276 during the period of its occupation by Steed-Kisker groups (to whom we attribute the bulk of the osteological remains), and how were these materials "managed" by the site occupants? Clearly, the first part of the question cannot be answered on the basis of the evidence from 23 CL 276, or from the other sites we have investigated in the Smithville Lake area; in all instances, as Falk reports (Chapter VII), the bone samples are highly fragmentary and generally uninformative of the species or genera represented. On present evidence, the final reduction and deposition of some osteological elements took place at the sites under consideration, but, as Falk (1979: 11) notes for the remains from the sites we excavated, "preservation seems primarily a function of selective burning, particularly for smaller animal forms."

Species diagnostic osteological elements representing large mammals at 23 CL 276 are limited to three examples identified as deer (*Odocoileus* cf. *virginianus*), and another specimen attributed to the cottontail rabbit (*Sylvilagus* sp.). This evidence lends support to Wood's thesis that the butchering of large mammals took place away from the residential sites. The data on soil conditions, if applicable to other Steed-Kisker sites, gives support to Wedel's thesis that detrimental soil environments are responsible for the condition and scarcity of bone at these sites. It seems to me that a reasonable combination of the two hypotheses, integrated with a model of the taphonomic processes experienced by the osteological remains at any site, would provide a better explanation for the observed situations than would either hypothesis alone.

EVALUATION OF F. A. CALABRESE'S HYPOTHESIS OF THE STEED-KISKER ORIGINS OF THE DONIPHAN PHASE

It will be useful to begin this section with the exact statement of Calabrese's hypothesis (1969:2):

> It is the intent of this study to establish, at least, qualitatively, a genetic relationship between northwestern Missouri's prehistoric Mississippian-derived complexes and eastern Nebraska's earliest known Plains riverine horticulturalists. As a working hypothesis, I suggest that the remains from the Friend and Foe site, 23 CL 113, and the Butcher site, 23 CL 118, are genetically related to the Steed-Kisker Focus of the Kansas City area and to components of the nearby Doniphan phase of the Nebraska variant (Krause 1969). It is argued that the total complex from the Smithville area is similar to Steed-Kisker in terms of village pattern, house distribution, artifact types and hunting patterns. There are some differences in ceramics and domestic architecture among the three complexes, but the overall similarities and even the differences suggest that the Doniphan phase and the Smithville sites share a common ancestry. In sum, I posit a true genetic relationship among the Smithville, Steed-Kisker and Doniphan phase sites.

In two chapters, Calabrese (1969) describes in great detail the material remains from the two sites (23 CL 113 and 118) excavated in 1967 and 1968, and in one chapter, he compares the settlement patterns, house patterns, ceramics, chipped stone artifacts, ground stone artifacts, fauna, flora, and C14 dates from the sites pertinent to the study. In his concluding chapter, Calabrese (1969: 217) states:

> The cultural system represented by the remains at Steed-Kisker, Gresham, Friend and Foe, and Butcher sites have been compared to components of the Doniphan phase of the Nebraska variant. It has been found that the primary differences between sites which show a marked Mississippian

> affiliation and those of the Doniphan phase lie in the ceramic tradition and house patterns.
>
> The ceramic differences are temper, surface treatment and slight modifications in vessel form. These differences can be explained in terms of factors which modify and influence local ceramic manufacturing practices. In light of the available radiocarbon dates, this change in ceramics appears to have taken probably less than 125 years' time.

Calabrese (ibid.: 219) further states:

> There is no difference in settlement pattern, community pattern, hunting pattern, or the kinds of chipped stone and ground stone tools between the Mississippian-derived Steed-Kisker and affiliated sites and the components of the Doniphan phase of the Nebraska variant.
>
> The foregoing similarities indicate a genetic relationship between the Mississippian-derived Steed-Kisker complex and the Friend and Foe site. When compared to the Doniphan phase of the Nebraska Variant, there are overall similarities of the Mississippian complex which reflect cultural development rather than culture contact or "influence." Thus, I suggest that the Doniphan phase of the Nebraska Variant is derived from the Mississippian base present in the Kansas City and surrounding area in the Eastern Glaciated region. It is apparent that peoples represented by this Mississippian complex were in these areas by at least A.D. 950 and possibly earlier.

Finally, Calabrese (ibid.: 220) repeats that the hypotheses that he has proposed needed empirical testing through further excavations and re-analysis of previously excavated materials.

In 1969, Calabrese (1974) returned to Smithville to resume investigations there. "The research strategy for the 1969 field season was designed to provide additional information about structural remains, community patterns, and, to a lesser degree, settlement patterns of Middle Mississippian occupation in the Little Platte valley" (ibid.: 1). The results of the 1969 season were disappointing and Calabrese did not pursue the hypothesis he had posed on Steed-Kisker-Doniphan phase relations in the 1974 report, concentrating, instead, on describing the results of the excavations, and the nature of Mississippian sites in the Kansas City area. He briefly reiterates his hypothesis that changing frequencies of shell- and grit-tempered wares indicates a "change through time in the preference of tempering materials on the part of the pottery makers in the Kansas City area. . . .that the frequency of grit-tempered sherds will be greater in later sites" (ibid.: 68). Unfortunately, the small ceramic samples precluded testing this hypothesis, according to Calabrese (ibid.).

In Chapter V, the grit-tempered and shell-tempered wares from the sites we investigated are compared to the two categories defined by Calabrese and are found to be identical, or virtually so. In contrast

to Calabrese, however, we have argued that the great majority of the grit-tempered sherds from the Little Platte valley sites represent a Late Woodland occupation and are not an intrinsic part of the Mississippian ceramic complex, as Calabrese insists. Ceramics are central to Calabrese's approach in tracing hypothesized relationships between the Steed-Kisker and Doniphan cultural phases, although house types and settlement patterns are also employed (ibid.: 200). Removing the grit-tempered ware from the Mississippian ceramic complex at Smithville leaves only the shell-tempered Platte Valley ware as representative of this complex.

Calabrese (ibid.: 200 ff.) compares the McVey ware, the dominant ceramic at the Doniphan phase sites (the Doniphan and the Nuzum sites), with the Platte Valley ware, and he reports that they differ in the following traits:

	Ware	
Trait	McVey	Platte Valley
Tempering material	grit	"shell temper predominates"
Polish and slipping	absent	present
Cord-wrapped paddle impressions	usually obliterated	obliterated or slipped
Shoulders	more rounded than --------------------->	
Rim Height	short, but sometimes greater than ------------->	short

Calabrese (1969: 202) properly notes that the above distinctions are qualitative, and in need of further study for quantification. He then speaks of the "shift" from shell to grit temper (ibid.), citing increasing frequencies of grit-tempered pottery in a series of sites beginning with the Steed-Kisker site (10 percent) and ending with the Nuzum site (82 percent) and Doniphan site (95 percent). Although, Calabrese has not presented a chronological ordering of the sites that provided these data, he (ibid.) states, "There is an increase in the frequency from site to site which suggests a gradual shift from shell tempered to grit tempered pottery." As no independently derived chronology of the sites exists, it can hardly be accepted that Calabrese has demonstrated a "shift" in tempering preferences. Moreover, it is interesting to note that the two sites closest to the Steed-Kisker heartland, the Doniphan and Nuzum sites, have the greatest proportions of grit-tempered pottery of the four Nebraska Variant sites that Calabrese included in his discussion.

Returning to the qualitative comparison of McVey and Platte Valley wares, Calabrese (ibid.: 203) minimizes, trait by trait, the differences that exist between these two groups, using statements like: "The absence of polish and slip on the McVey types, complemented by the presence of smoothed surfaces, indicates that the Doniphan phase potters were simply spending less time finishing vessel exteriors;" and, changes in the form of the shoulder are "probably related to the potter's abilities to produce an angular shoulder, which is a somewhat more difficult form to produce than rounded shounders." Calabrese (ibid.) cites Anderson's (1961: 67) statement regarding the presence of shell-tempered vessels, virtually indistinguishable from McVey vessels except for the differences in temper, as evidence for the "small degree of variation in the McVey and Platte Valley wares." Anderson's statement, of course has nothing to do with the posited similarity between McVey and Platte Valley; he is simply noting the great similarity of a rare, shell-tempered form to the predominant grit-tempered type in the Kilbom site assemplage (cf., Anderson 1961.: 7). Finally, Calabrese (1969: 204) concludes:

> The foregoing discussion shows that the differences between the McVey Ware and Platte Valley Ware types are not great and probably represent evolution in pottery making practices rather than manufacture by two groups distinct [sic] with different ceramic techniques.

Calabrese's arguments based on ceramic comparisons can be challenged on several counts. *There are*, in fact, noteworthy differences between the shell-tempered Platte Valley ware and the McVey and other associated wares in the Nebraska Variant. The differences are not slight, as Calabrese asserts, but quite the contrary, in my opinion. [Rhetorically, one might ask, what would be the significance of the "evolutionary change" by which Platte Valley ware became converted to McVey ware if the differences between them were only "slight"?] The marked differences are attested to by comparing the cross-mended Nebraska Culture rim sherd from 23 CL 276 with the Platte Valley sherds from the same site (see Chapter V and Plates 5-1 and 5-2).

On the basis of my examination of the ceramics from the Friend and Foe and Butcher sites and my comparison of these ceramics with those recovered from Sites 23 CL 226, 274, and 276, I am persuaded that the grit-tempered pottery from the former two sites is morphologically very similar to the grit-tempered sherds from the latter three sites. This means, if I am correct, that the ceramic assemblages that Calabrese uses to identify the Middle Mississippian phase in the Smithville area are hybrid creations, that is, mixtures of Late Woodland and Middle Mississippian wares. In other words, 25 percent (the proportion of grit-tempered sherds) of the Friend and Foe ceramic assemblage (Calabrese 1969, 1974) does not belong to the Mississippian component, in my opinion, and only the shell-tempered Platte Valley ware does. Failure to detect the mixed nature of the Smithville ceramic assemblages encouraged Calabrese to trace the "shift" in the proportions of grit and shell tempering within the Steed-Kisker complex and beyond, into the Doniphan phase.

Clearly, formal, detailed comparisons between the Smithville ceramic assemblages and the Steed-Kisker site assemblage need to be made. The latter does indeed include a small proportion of grit- and gravel-tempered pottery that, in some respects, resembles the shell-tempered ware (Wedel 1943: 79; Shippee, personal communication, November 1979). This grit- and gravel-tempered pottery in the Steed-Kisker assemblage is generally quite different from the grit-tempered pottery from the Smithville sites, although Wedel (ibid.) notes that six grit-tempered sherds display cord-roughening. These six sherds, set apart from the bulk of the grit-tempered sherds by Wedel, may represent a very minor Late Woodland element in the Steed-Kisker site ceramic assemblage; only reexamination of these materials will allow for a positive determination of this matter. On the basis of the ceramic evidence from the Steed-Kisker site alone, a distinctive but minor grit-tempered element with vessel forms similar to the large, shouldered, shell-tempered vessels, may well be an intrinsic part of this Middle Mississippian complex. Yet, the marked differences between this grit-tempered element from the Steed-Kisker site and the grit-tempered ware from the Smithville Lake sites emphasize the distinctive and non-Mississippian nature of the latter.

Six calibrated radiocarbon dates from features, midden deposits, or houses from the Steed-Kisker site fall between A.D. 950 and A.D. 1250, with four falling into the last 20 years of this period (Shippee 1972:8, Table 1). Three centuries of occupation, even episodic, at this site would probably witness detectable cultural change among the inhabitants and in some aspects of their material culture. The adoption of or experimentation with grit and gravel tempering, perhaps under the influence of contacts with the contemporary Nebraska Variant groups to the north, might be one of the changes to have taken place. The peculiar distribution of the grit-tempered potsherds at 23 CL 13, where 180 of a total of 255 sherds (Wedel 1943: 75, Table 7) come from a single pit, causes one to pause, and wonder if the practice of tempering with grit was not a temporary or short-term practice among the potters at the Steed-Kisker site.

A second major problem with the attempt at deriving the Doniphan phase ceramics from the Platte Valley ware is the lack of close chronological controls, and the existence of evidence that, in fact, the Nebraska Variant and the Steed-Kisker cultural phases are contemporary. The cross-mended Nebraska Phase rim and body sherds from 23 CL 276, is one instance, and the incised and plain Middle Mississpppian sherds from the Doniphan site itself (Wedel 1959) are a second instance, both of which give strong evidence for the contemporaneity of the two phases. Calabrese (1969: 218), in fact, notes that radiocarbon dates from one house at the Steed-Kisker site and another from a house at site 23 BN 2, each with Mississippian ceramics, indicate these structures are contemporary with the Nebraska Variant. It is difficult to reconcile this evidence of the contemporaneity of the Steed-Kisker and Nebraska Variant phases and Calabrese's estimate of 125 years or less for the ceramic changes that he postulates to have occurred.

The three century span suggested by the radiocarbon dates from the Steed-Kisker site (23 PL 13) is probably greater than the actual period of this site's occupation by Middle Mississippian groups (see Table 9-1).

This deduction is based on the two widely spaced dates from House 3, A.D. 860 and A.D. 1230, uncorrected, or A.D. 950 and 1250, corrected (Shippee 1972), an unlikely situation, in my estimation. If the cluster of four uncorrected dates between A.D. 1080 and 1230 is accepted as the period of the site's occupation by the Middle Mississippian peoples, the possibility of their having been ancestral to the Nebraska Variant is very remote as this cultural phase was well established by A.D. 1100 or earlier (Blakeslee and Caldwell 1979: 19, 22, Table 1).

On the basis of a series of 29 radiocarbon dates from 17 Nebraska Variant sites in eastern Nebraska and northeastern Kansas (ibid.), it is reasonable to infer that this prehistoric cultural manifestation came into existence slightly before or during the 11th century A.D. Had this development been spawned by the Kansas City area Middle Mississippian culture, as Calabrese hypothesizes, the latter obviously had to precede the former. Table 9-1 displays the distribution of radiocarbon dates for the Steed-Kisker sites in the Kansas City area, and for Nebraska Phase sites in eastern Nebraska, southwestern Iowa, and northeast Kansas. Comparison of the respective dates suggests the possibility that the Steed-Kisker complex does essentially precede the Nebraska Phase. However, two early Steed-Kisker Phase dates are probably invalid because much later dates come from the same houses (Friend and Foe site, House 3, and the Steed-Kisker site, House 3). Moreover, Steed-Kisker Phase dates before A.D. 1000 are suspect, especially since we have shown that eighth, ninth, and tenth century A.D. dates at certain sites with Steed-Kisker components actually belong to Late Woodland components at these sites.

Blakeslee and Caldwell (1979: 20) assign the Nebraska Phase to the period from 525 to 900 radiocarbon years ago (i.e., A.D. 1050 to A.D. 1425), after eliminating seven anomalous early and late dates from the series. The Nebraska Phase clearly lasts one or more centuries beyond the Steed-Kisker Phase, but they are apparently contemporary between about A.D. 1000 and A.D. 1300. Chronological controls are still too inexact to form a basis for determining if a Steed-Kisker-Doniphan phase transition is a tenable proposition. On present evidence, however, it is hard to visualize this as a viable hypothesis from the perspective of the existing radiocarbon chronology.

REDEFINING THE STEED-KISKER PROBLEM

The complexities of the nature of the potential Middle Mississippian contribution to the Central Plains tradition and specifically the Nebraska Phase have recently been treated by Terry Steinacher (1976). In a well-reasoned presentation, he reviews the role of the Smoky Hill Phase in the culture history of the Central Plains Tradition and notes that the long held theory of the Mississippian source of the Plains horticulture no longer fits the available evidence. Rather, Steinacher (ibid.: 103) sees an indigenous origin for this complex, stemming from a post-Plains Woodland base. This transformation may have begun as early as about A.D. 500 with the introduction and adoption of 8-rowed maize and the development of climatic conditions

more favorable to maize horticulture. This new maize derived ultimately from the Southwest (ibid.: 105).

The transformed Plains Woodland complex, known as the Solomon River Phase, owes little or nothing to Caddoan or Mississippian groups. Material changes include, according to Steinacher (ibid.: 105-106), the use of side-notched projectile points, alternately beveled knives, chipped stone celts, bison scapula hoes, the replacement of the characteristic conical Plains Woodland vessel form by the shouldered and rimmed subconical vessel form, and the introduction of the rectangular or square earthlodge.

Subsequent developments gave rise to the Upper Republican Phase (with possible stimuli from the initial Middle Missouri Tradition) and the Smoky Hill Phase in northeastern Kansas and southeastern Nebraska away from the Missouri River. Smoky Hill groups are said to have had contacts with the Caddoan cultures and subsequently with the Middle Mississippian Steed-Kisker culture in an "interface zone" that encompassed the zone between the Lower Kansas River and the Missouri River above Kansas City into southeastern Nebraska (ibid.: 109, Fig. 19). Within this "interface zone," there occurred contact and acculturation that "resulted in the formulation that we recognize as the Nebraska Phase, the main locus of which was along the Missouri River in eastern Nebraska" (ibid.: 109). Within this zone, Steinacher predicts that a number of different types of sites should occur: Steed-Kisker phase sites, Smoky Hill phase sites, contact-type sites, and classic Nebraska Phase sites.

This interaction was not beneficial to the Steed-Kisker Phase which, as Steinacher (ibid.: 114) notes, seems to have terminated about A.D. 1300, while the Smoky Hill transformation led to one of three possibilities:

1. complete absorbtion into the Nebraska Phase;

2. co-existence for awhile with the Nebraska Phase and then incorporation into the Loup River Phase; or

3. incorporation into the Panhandle Phase.

The demise of the Steed-Kisker Phase was not Steinacher's concern, but nevertheless remains a real culture-historical problem, one clearly in need of further research. Steinacher's model of Smoky Hill transformation and Calabrese's hypothesis suggest several possibilities for the fate of the Steed-Kisker Phase population:

1. amalgamation of Smoky Hill and the Steed-Kisker phases into the forerunner of the Nebraska phase (modification of Steinacher's No. 1);

2. transformation directly into the Nebraska phase (as in Calabrese 1969);

3. extermination of the Steed-Kisker without issue;

4. the removal of the Steed-Kisker populations to other areas, e.g., the Ozark flanks, or back to the Mississippi Valley.

The same objections leveled at Calabrese's hypothesis above apply to choice No. 1, that is, there appears to be insufficient time for this amalgamation to have taken place between the time of arrival of the Middle Mississippian culture in the Kansas City area and the emergence of the Nebraska Phase. Possibility No. 2 is rejected on the same grounds. Possibility No. 3, the extermination of the Steed-Kisker population without issue, remains a possibility, of course, and the truncation of C14 dates at about A.D. 1250-1300 lends support to this thesis. However, the emigration of Steed-Kisker groups out of the Kansas City area would give the same appearance in the Steed-Kisker heartland, i.e., abandonment of residential loci and reappearance elsewhere. The latter possibility has already been advanced above. Of the four possibilities listed above, only Nos. 3 and 4 appear, on present evidence, to be viable and worthy of further research.

The testing of these hypotheses is beyond the scope of this report and, I suspect, beyond the capabilities inherent in the published and unpublished archaeological data pertinent to the subject. Not only are published reports on the Ozarkian and Brush Creek Steed-Kisker needed, for instance, but directed research outside the realm of contract archaeology and cultural resource management programs is needed. The remaining Steed-Kisker sites in the Kansas City area may never be impacted by federal or state programs, but they will surely be affected by other activities, to their detriment, and at the loss of information on this cultural form. The full nature of the Steed-Kisker adaptation can not be discovered by limiting investigations to the reservoirs or the rights-of-way or relying on pioneer investigations of three or four decades ago. If there was a Steed-Kisker society living in the Kansas City area for two centuries or so, its nature must be defined by investigations of all the loci of its activities, such as the bluff-tops and interfluves, as well as the hill-slopes and the valley bottoms. Activity models developed for these semi-agrarian peoples are needed to guide the field research, of course, but knowledgeable collectors can likely pinpoint the sites still present and profitable.

The hypothetical widespread Steed-Kisker presence in the northern fringe of the Ozarks needs to be evaluated through the analysis of site collections already in hand and through directed field research. The published reports of a Steed-Kisker component in an Ozark rock shelter (Wood 1963 and 1968) are insufficient by themselves, even when supplemented with personal communications, to demonstrate the full nature of Steed-Kisker activity in this area. The planned future cultural resource surveys in the Ozark lakes might pay special attention to this topic, but it is to be hoped that problem-oriented research beyond the contract aegis will also be undertaken in the area.

Thus far, only the potential transformation or demise of the Steed-Kisker culture have been discussed in this section. Surely, its origins are also worthy of consideration. The Middle Mississippian origins of the Steed-Kisker Phase are generally taken for granted. From the beginning of scientific publication on the subject, in Waldo Wedel's

(1943) treatise, this hypothesis has held forth. J. Mett Shippee supports it; so, of course, does Patricia O'Brien. Yet the mechanisms and even the timing of the migration from the Cahokia area or Mississippi Valley are no better known than they were 40 years ago.

The nature of relationships sustained between Cahokia and the Steed-Kisker peoples over generations or more has been postulated but hardly tested. For instance, O'Brien (1973: 4; 1976: 4) cites the presence of Ramey Incised pottery from site 23 PL 16 and the Vandiver Mound as "unquestioned evidence of trade, specifically with Cahokia." Furthermore, O'Brien (1973: 6) has proposed that the Steed-Kisker groups provided meat and agricultural foodstuffs for the Cahokia population, these commodities being transported down the Missouri River in bullboats. If such relations were maintained between the Kansas City area Steed-Kisker groups and Cahokia, one would predict a high degree of integration and centralization among the former to be manifested. Such evidence is, sad to say, completely lacking in the archaeological record. The logistics of the transportation of foodstuffs to Cahokia may not have been beyond the capabilities of the Steed-Kisker population, but the widespread material evidence of such a sustained, reciprocal relationship is simply nonexistent. Similarly, evidence for a centralized political organization among the Steed-Kisker population is lacking. The burial mounds indicate no more than a modest degree of social integration in restricted districts. The four-sided, cornerless structure at 23 CL 276 may be viewed in the same light.

If the Steed-Kisker peoples came from Cahokia or that general region, they migrated without most of the material paraphernalia and, more important, the organization and attitudes that were prevalent at Cahokia. The ubiquitous presence of centralized authority and planning (i.e., mid-continental despotism) at Cahokia may have been sufficient reason for a disenchanted group to break away, seek a new home, and discontinue significant contacts with the parent society. A relationship of alienation may have been more characteristic of that which obtained between Cahokia and the Steed-Kisker groups than a interdependent, mutually beneficial association, as implied by O'Brien.

SUMMARY AND OVERVIEW

The Steed-Kisker Phase is a regional Middle Mississippian cultural manifestation localized in the Kansas City area, especially (as presently known) north of the Missouri River in Platte and Clay Counties. It is also represented in the northern fringe of the Ozarks, at one site, some 100 miles southeast of Kansas City, and may be more widespread in that general area. According to radiocarbon assays from nine sites, the Kansas City Steed-Kisker Phase dates to approximately A.D. 1000 to A.D. 1300, but both shorter and longer durations have been advocated. It is contemporary, in part, with the Nebraska Phase to the north and the Smoky Hill Phase to the west; it clearly had some contacts with the former, as ceramic evidence from the Little Platte valley (Site 23 CL 276) testifies.

Ecofactual evidence from a number of sites, although never abundant, allows the interpretation that the Steed-Kisker groups were partly horticultural in their subsistence activities, but also relied on hunting and collecting edible wild plants. The location of some residential units on the Little Platte River floodplain leads one to infer that they were cultivating these lands; they raised maize and squash or pumpkin, at least, and gathered wild nuts, and marshelder and lambsquarter seeds. The large mammals taken in hunting were initially butchered away from the residential settlements, and the osteological elements returned to the house areas were reduced by various agents, including acidic soil conditions, removing most of the remaining diagnostic attributes.

A comprehensive, theoretical model of the Steed-Kisker settlement system and activity schedule finds limited empirical substantiation. Burial mounds, cemeteries adjacent to residential units, and small farmsteads with a few houses have been demonstrated through excavations. A postulated uni-functional storage site has been rejected, not because of theoretical arguments, but because the particular evidence presented was insufficient to support that interpretation.

Our investigations at sites 23 CL 274 and 23 CL 276 in the lower Smithville Lake reservoir have revealed two unique Steed-Kisker sites. The former is interpreted to have been a facility for roasting or parching plant seeds, or as an oven, separate from any residential unit. In other words, our interpretation of specific physical evidence from 23 CL 274 confirms the existence of single function sites in the Steed-Kisker settlement and activity system, a particular type of facility that would probably not be conceived in a theoretical model, although the activity itself might well be included in that model.

The large, four-sided, cornerless and roofless structure that once dominated 23 CL 276 may have functioned as a community center, serving the needs of the Steed-Kisker population scattered along the Little Platte River above Smithville. Its exact purpose, of course, is unknown, but its precise measurements, its orientation to cardinal directions, and its possible astronomical alignments suggest a special function for this structure, related perhaps to a belief system involving renewal or harvest concepts and ceremonies. This speculation implies no great degree of social complexity, of course, as such ideas and activities are present among band-level societies. However, it may be appropriate to think of the Steed-Kisker groups along the Little Platte River as being organized at a somewhat higher level, a segment of a tribe, perhaps, other segments being dispersed along other drainages in the area. The presence of two burial mounds in the Smithville district supports the idea that the Steed-Kisker Phase groups residing here were part of an interacting community of people with common traditions and shared activities. Some of these activities, we believe, were conducted in and around the large structure at site 23 CL 276.

The origins and fate of the ultra-rural Steed-Kisker population are still open to debate. Amalgamation with the Smoky Hill population or absorption into the Nebraska Phase population are theoretical possibilities, since all three are partly contemporary. However, the transformation of the Steed-Kisker into the Doniphan Phase is discounted

because the former is not clearly antecedent to the latter, and, in fact, is probably contemporary with it. The hypothesis that the Steed-Kisker peoples may have returned to Cahokia implies, it would seem, sustained relations between the two areas for two or more centuries, evidence for which is virtually nonexistent. The Steed-Kisker presence in the northern Ozarks may reflect economic exploitation of that area by Kansas City based groups, or a much larger oikouemene for the Steed-Kisker culture than is generally conceded. Alternatively, it could conceivably indicate the final dispersal of the Steed-Kisker population and the beginning of their transformation in late prehistoric times. A large series of C14 dates from the Ozark area Steed-Kisker sites is sorely needed to delimit these possibilities, and full publication of the site surveys and excavations already conducted is vital to the understanding of the fate of the Steed-Kisker culture.

Obviously, questions on the origins and fate of the Steed-Kisker culture and population cannot be answered from the perspective of Smithville Lake. GAI Consultants' investigations have contributed to the refinement of the Steed-Kisker settlement system, and we have suggested the incompleteness of the empirical record in this regard. The anomalous status of one site (23 CL 229), eight miles east of the main group of Steed-Kisker sites, remains; testing demonstrated the presence of in situ artifactual remains but an insufficient area was sampled to ascertain the complexity of this site. Because of its location at the edge of a steep bluff within and above the fluctuating lake level, the cultural remains at 23 CL 229 are vulnerable to future lake edge erosional action.

Our geological investigations have contributed only limited information related to the Steed-Kisker phase; two floodplain sites (23 CL 273 and 275) are interpreted to have been dispersed by repeated alluvial deposition and plowing over a period of a century or more. GAI's investigations have outlined the geological history of the Little Platte Valley and have examined locations with the potential for containing deeply buried prehistoric cultural remains. Survey of locales identified on geochronological criteria led to the discovery of 20 places with cultural remains, 12 of which were registered as sites with the Missouri Archaeological Survey. Deep testing in 9 localities encountered archaeological remains in two instances in colluvial or alluvial deposits. One produced a single, diagnostic Middle Woodland projectile point in a zone of thinly scattered debitage; the second was a concentration of fire-burned rocks with a single, grit-tempered Woodland sherd.

The absence of Archaic and Early Woodland cultural remains in these deep tests and the overall paucity of early and middle Holocene cultural remains may relate to the hypothesis that the erosional and depositional history of the Little Platte River valley have not been favorable to the burial of cultural remains. The scarcity of Archaic and Early Woodland remains in our deep tests may correlate with the prevalence of relatively dry climatic conditions over a long period of time. Geomorphic considerations and morphometric data from sediment samples support the hypothesis of a long dry climatic episode during the middle and late Holocene in the Little Platte drainage. This hypothesis, however,

should be considered tentative and in need of further testing in the general region.

RECOMMENDATIONS FOR CULTURAL RESOURCE MANAGEMENT PROGRAMS

Cultural resource management practices for reservoir facilities under development should include the monitoring of clearing and construction activities, and at least regular spot checks to help insure the evaluation and preservation or mitigation of accidentally encountered sites. In our opinion, no terrestrial site survey, no matter how thorough or comprehensive, is likely to find and record all the prehistoric sites in a reservoir. Cultural resource managers undoubtedly recognize this fact and should be encouraged to develop strategies and programs to insure implementation of periodic cultural resource assessments during construction phases as well as beyond. The initial areal site survey needs to be supplemented by subsequent area specific site surveys, as clearing operations and construction schedules progress, as a normal part of the cultural resource management program for the facility.

Contingency plans supported by readily available funding should be an integral part of the CRM plan. Emergency mitigation requires prompt action at several levels within the agency if sites discovered during the later clearing and construction phases are to be preserved or investigated. Crucial to the achievement of this level of CRM responsibility is an awareness on the part of agency officials that initial, even comprehensive, site surveys cannot be expected to discover all the potentially significant sites, and that surveys of areas cleared of vegetation or altered by construction activities will almost invariable produce more sites.

Specific recommendations for additional testing of prehistoric cultural resources have been previously submitted to the Corps of Engineers, Kansas City District, in the form of an interim report (January 1979), which is included as Appendix B. They remain as the core of our recommendations for the management of the cultural resources at Smithville Lake. In part, these recommendations will be made moot because the filling of the reservoir to create Smithville Lake will put many of the listed sites completely out of reach. In addition, creation of the recreational facilities around the edges of the lake will attract thousands of visitors yearly. The remaining prehistoric sites located above the multi-purpose pool level will need to be monitored for possible adverse activities, either planned or nonintentional (e.g., locating facilities where sites are recorded, allowing public use of areas where sites are located, etc.). Periodic shoreline surveys should be conducted to determine what effect lake edge erosion is having on prehistoric cultural deposits.

The final area that our recommendations for cultural resource management programs affect is in the area of public education. Since plans are underway for a public information center at Smithville Lake, it would be appropriate to devote some space within this facility to

telling the story of the archaeological research conducted there and the discoveries made in the course of this research. This exposition could be accomplished, in part, by using displays in which the culture history of the district could be outlined, artifacts exhibited, and the techniques of archaeology explained. In addition, a small pamphlet should be prepared with basically the same information related in more detail. The Corps of Engineers might even want to consider erecting a full-scale facsimile of the four-sided structure GAI Consultants discovered at Site 23 CL 276; this action would allow the public to experience the nature of this prehistoric structure and determine for themselves if there is any astronomical significance to this site.

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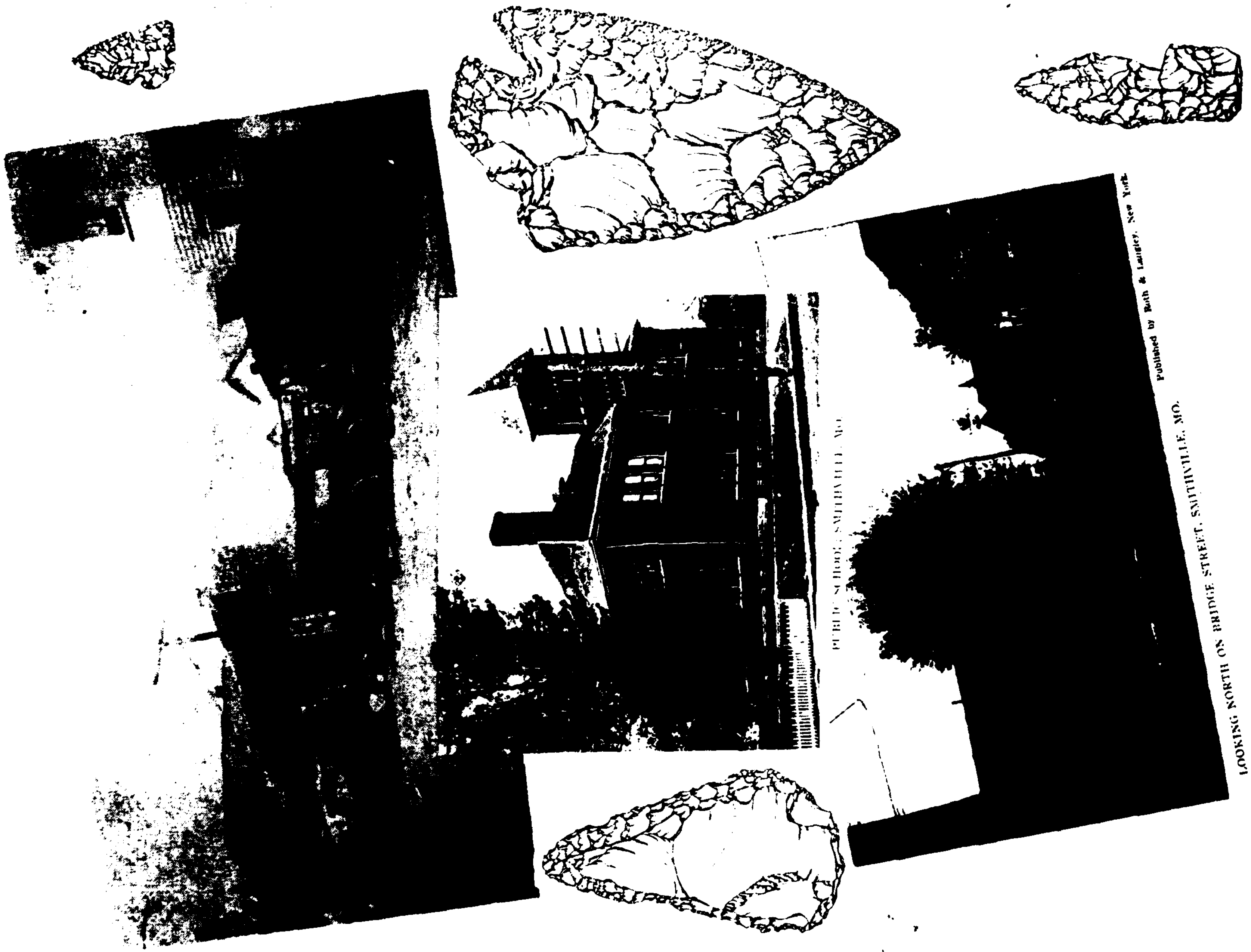

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